MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE SCANNER (TEXUAL BITS)

Very Short Questions 2 Marks Functions

1. If $f(x) = 2x - 1, g(x) = \frac{x+1}{2}$ for all $x \in R$, find $(gof)(x)$

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2. If $f(x) = 2, g(x) = x^2, h(x) = 2x$ then find $(fogoh)(x)$

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3. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 1$ and $g(x) = x^2 + 1$ then find $(fog)(2)$.

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4. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 1, g(x) = x^2 + 1$ then find

(i) $(fog)(2)$

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5. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 1, g(x) = x^2 + 1$ then find

(ii) (gof)(x).

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6. If $f(x) = \frac{x+1}{x-1}, x \neq 1$ then find $(fofof)(x)$.

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7. If f and g are real valued functions define by $f(x) = 2x - 1$ and $g(x) = x^2$ then find (ii) $(fg)(x)$

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8. If f and g are real valued functions defined by $f(x) = 2x - 1$ and $g(x) = x^2$ then find

(ii) (f+g+2)(x).

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9. If $f = \{(1, 2), (2, -3), (3, -1)$ then find

(i) $2f$.

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10. If $f = \{(1, 2), (2, -3), (3, -1)$ then find

(ii) f^2.

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11. If $f = \{(1, 2), (2, -3), (3, -1)$ then find

(i) $2 + f$.

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12. If $f = \{(1, 2), (2, -3), (3, -1)$ then find

(ii) $\sqrt{f}$.

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13. If $A = \{-2, -1, 0, 1, 2\}$ and $f: A \to B$ is a surjection defined by $f(x) = x^2 + x + 1$ then find B.

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14. If $f: Q \to Q$ is defined by $f(x) = 5x + 4$, find f^{-1}.

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15. Find the inverse of the real function of $f(x) = ax + b, a \neq 0$.

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16. Find the inverse function of $f(x) = 5^x$.

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17. If $A = \left\{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}\right\}$ and $f: A \to B$ is a surjection defined by $f(x) = \cos x$ then find B.

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18. Find the domain of the real function $f(x) = \sqrt{16 - x^2}$

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19. Find the domain of the real function $f(x) = \sqrt{x^2 - 25}$

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20. Find the domain of the real function $\sqrt{x^2 - 3x + 2}$

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21. Find the domain of the real function $f(x) = \frac{1}{\sqrt{1-x^2}}$

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22. Find the domain of the real function $\log\left(x^2 - 4x + 3\right)$

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23. Find the domain of the real function $f(x) = \frac{1}{\log(2-x)}$

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24. Find the domain and range of the function $f(x) = \frac{x}{2-3x}$

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25. If $f(x) = 1/x$, $g(x) = \sqrt{x}$ for all $x \in (0, \infty)$, then find (gof)(x).

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26. If $f(y) = \frac{y}{\sqrt{1-y^2}}, g(y) = \frac{y}{\sqrt{1+y^2}}$ then show that $fog(y) = y$.

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27. If $f, g: R \to R$ are defined $f(x) = \begin{cases} 0 & \text{if} \quad x \in Q \\ 1 & \text{if} \quad x \in Q \end{cases}, g(x) = \begin{cases} -1 & \text{if} \quad x \in Q \\ 0 & \text{if} \quad x \notin Q \end{cases}$ then find $(fog)(\pi) + (gof)(e)$.

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28. $f: R - \{0\} \to R$ is defined as $f(x) = x + \frac{1}{x}$ then show that $(f(x))^2 = f(x^2) + f(1)$

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29. If $f: R - \{0\} \to R$ is defined by $f(x) = x^3 - \frac{1}{x^3}$, then S.T $f(x) + f(1/x) = 0$.

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30. If $f: R - (\pm 1) \to R$ is defined by $f(x) = \log\left|\frac{1+x}{1-x}\right|$, then show that $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$.

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31. If $f: R \to R$ is defined by $f(x) = \frac{1-x^2}{1+x^2}$ then show that $f(\tan\theta) = \cos 2\theta$.

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32. If $f(x) = \frac{\cos^2 x + \sin^4 x}{\sin^2 x + \cos^4 x} \forall x \in R$ then show that $f(2012) = 1$.

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33. If $f(x) = x^2$ and $g(x) = |x|$, find the functions.

(i) $f + g$

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34. If $f(x) = x^2$ and $g(x) = |x|$, find the functions.

(ii) fg

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35. If $A = \{1, 2, 3, 4\}$ and $f: A \to R$ is a function defined by $f(x) = \dfrac{x^2 - x + 1}{x + 1}$ then find the range of f.

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36. Is $g = \{(1, 1), (2, 3), (3.5), (4, 7)\}$ is a function from $A = \{1, 2, 3, 4)$ to $B = \{1, 3, 5, 7\}$?

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37. If the function $f: \{-1, 1\} \to \{0, 2\}$, defined by $f(x) = ax + b$ is a surjection, then find a & b.

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38. If Q is the set of all rational numbers, and $f: Q \to Q$ is defined by $f(x) = 5x + 4, \forall x \in Q$, show that f is a bijection.

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39. If $f: N \to N$ is defined as $f(x) = 2x + 5$, is f onto?

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40. If $A = \{x: -1 \leq x \leq 1\}, f(x) = x^3$, which of the following are onto?

(ii)$g: A \to A$

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41. If $A = \{x: -1 \leq x \leq 1\}, g(x) = x^3$, which of the following are onto?

(ii)$g: A \to A$

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42. Determine whether the function $f: R \to R$ definded by $f(x) = \frac{2x+1}{3}$ is one one (or) onto (or) bijection.

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43. Determine whether the function $f: R \to (0, \infty)$ defined by $f(x) = 2^x$ is one one (or) onto (or) bijection.

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44. Determine whether the function $f: (o, \infty) \to R$ defined by $f(x) \log_e x$ is one one (or)onto (or)bijection.

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45. Determine whether the function $f: R \to [0, \infty)$ defined by $f(x) = x^2$ is one one (or)onto (or)bijection.

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46. Determine whether the function $f: R \to [0, \infty)$ defined by $f(x) = x^2$ is one one (or)onto (or)bijection.

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47. Determine whether the function $f: R \to R$ defined by $f(x) = x^2$ is one one (or) onto (or) bijection.

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48. Find the inverse function of $f(x) = \log_2 x$

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49. If $f(x) = 1 + x + x^2 + \ldots\ldots$ for $|x| < 1$ then show that $f^{-1}(x) = \dfrac{x-1}{x}$.

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50. If $f(x) = e^x$ and $g(x) = \log_e x$, then show that fog=gof and find f^{-1} and g^{-1}.

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51. If $f(x) = \frac{x-1}{x+1}, x \neq \pm 1,$ show that $fof^{-1}(x) = x.$

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52. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 2, g(x) = x^2 + 1,$ then find (i) $\left(gof^{-1}\right)(2)$

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53. If $f: R \to R, g: R \to R$ are defined by $f(x) = 2x - 3, g(x) = x^3 + 5$ then find $(\text{fog})^{-1}(x)$

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54. Let $A = \{1, 2, 3\}, B = \{a, b, c), C = \{p, q, r\}$. If $f: A \to B, g: B \to C$ are defined by $f = \{(1, a), (2, c), (3, b)\}, g = \{a, q), (b, r), (c, p)\}$ then show that $f^{-1}og^{-1} = (gof)^{-1}$.

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55. Let $f = \{(1, a), (2, c), (4, d), (3, b)\}$ and $g^{-1} = \{(2, a), (4, b), (1, c), (3, d)\}$ then show that $(gof)^{-1} = f^{-1}og^{-1}$.

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56. Find the domain of $\sqrt{9 - x^2}$

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57. Find the domain of the real function $f(x) = \sqrt{a^2 - x^2}, a > 0$

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58. Find the domain of the real function $f(x) = \sqrt{(x+2)(x-3)}$

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59. Find the domain of the real function $f(x) = \sqrt{4x - x^2}$

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60. Find the domain of the real function $f(x) = \sqrt{2-x} + \sqrt{1+x}$

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61. Find the domain of $\dfrac{1}{\sqrt{x^2 - a^2}}$

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62. Find the domain of the real function $\frac{\sqrt{2+x}+\sqrt{2-x}}{x}$

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63. Find the domain of the real function $\frac{\sqrt{3+x}+\sqrt{3-x}}{x}$

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64. Find the domain of the real function $f(x)=\frac{1}{(x^2-1)(x+3)}$

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65. Find the domain of the real function $\frac{2x^2-5x+7}{(x-1)(x-2)(x-3)}$

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66. Find the domain of the real function $\frac{1}{6x - x^2 - 5}$

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67. Find the domain of $f(x) = \frac{3^x}{x + 1}$

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68. On what domain the functions $f(x) = x^2 + 2x$ and $g(x) = x + 6$ are equal?

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69. Find the domain of definition of the function $y(x)$, given by the equation $2^x + 2^y = 2$.

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70. Find the domain of the real valued function $f(x) = \sqrt{(x-\alpha)(\beta-x)}, (\theta < \alpha < \beta)$.

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71. Find the domian of the real valued function $f(x) = \sqrt{\log_{0.3}(x-x)^2}$

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72. Find the domain of $f(x) = \sqrt{x - |x|}$

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73. Find the domain of $f(x) = \sqrt{[x] - x}$

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74. Find the domain of $f(x) = \sqrt{[x] - x}$

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75. Find the domain of $f(x) = \log(x - |x|)$.

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76. Find the domain of $f(x) = \sqrt{x^2 - 1} + \frac{1}{\sqrt{x^2 - 3x + 2}}$

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77. Find the domain of $f(x) = \sqrt{x + 2} + \frac{1}{\log_{10}(1 - x)}$

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78. Find the domain of $f(x) = \sqrt{\log_{10}\left(\frac{3-x}{x}\right)}$

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79. Find the domain of the real function $f(x) = \frac{1}{\sqrt{[x]^2 - [x] - 2}}$.

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80. Find the domian and range of the real function $f(x) = \sqrt{9 - x^2}$

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81. Find the domain and range of the real valued function $f(x) = \frac{2+x}{2-x}$

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82. Find the domain and range of the function $f(x) = \frac{x}{1+x^2}$.

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83. Find the domain and range of the function $f(x) = |x| + |1+x|$

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84. Find the range of the real function $\frac{x^2-4}{x-2}$

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85. Determine whether the function $f(x) = x\left(\frac{e^x-1}{e^x+1}\right)$ is even or odd

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86. Determine whether the function $f(x) = a^x - a^{-x} + \sin x$ is even or odd.

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87. Determine whether the function $f(x) = \sin x + \cos x$ is even or odd.

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88. Determine whether the function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is even or odd.

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89. P.T the real valued function $f(x) = \frac{x}{e^x - 1} + \frac{x}{2} + 1$ is an even function on $R - \{0\}$.

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90. If $f(x+y)=f(xy)\,\forall x, y \in R$ then prove that f is a constane function.

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91. If the function $f: R \to R$ defined by $f(x)=\frac{3^x+3^{-x}}{2}$, then S.T $f(x+y)+f(x-y)=2f(x)f(y)$.

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92. If $f(x)=\cos(\log x)$, then show that $f\left(\frac{1}{x}\right).f\left(\frac{1}{y}\right)-\frac{1}{2}\left[f\left(\frac{x}{y}\right)+f(xy)\right]=0$

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93. If $f: [1, \infty) \to [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$ then find $f^{-1}(x)$

.

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94. Let $f(x) = x^2, g(x) = 2^x$. Then solve the equation $(fog)(x) = (gof)(x)$.

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95. If $f: R \to R$ is defined as $f(x+y) = f(x) + f(y) \forall x, y \in R$ and $f(1) = 7$, find $\sum_{r=1}^{n} f(r)$.

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96. Define an onto function. Give one example.

(A) A function $f: A \to B$ is said to be an onto function if $\forall b \in \exists a \in A$

such that $f(a) = b$ (or) if range of f = codomain of f then f is an onto function.

Ex. $f: R \to R$ such that $f(x) = 2x + 3$

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97. Define an onto function. Give one example.

(A) A function $f: A \to B$ is said to be an onto function if $\forall b \in \exists a \in A$ such that $f(a) = b$ (or) if range of f = codomain of f then f is an onto function.

Ex. $f: R \to R$ such that $f(x) = 2x + 3$

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98. Define an even function, odd function. Give an example to each

(A) A fuction f(x) is said to be an

$$(i)\text{even function} \quad \text{if} \quad f(-x) = f(x) \quad Ex: f(x) = x^2$$
$$(ii)\text{odd function} If f(-x) = -f(x) \quad Ex: f(x) = x^3.$$

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99. Define identity function.

(A) A function $fA \to A$ is said to be an identitiy function on A if $f(x) = x, \forall x \in A$.

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100. Define Constant function.

(A) A function $f: A \to B$ is said to be a constant function if $f(x) = k, \forall x \in A$, k is a fixed element of B.

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Very Short Questions 2 Marks Matrices

1. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$, find $3B - 2A$.

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2. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix} 2X + A = B$ then find X.

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3. Find the trace of $\begin{bmatrix} 1 & 3 & -5 \\ 2 & -1 & 5 \\ 2 & 0 & 1 \end{bmatrix}$

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4. if $A = \begin{bmatrix} 2 & 4 \\ -1 & k \end{bmatrix}, \text{ and } A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ find the value of k.

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5. If $A = \begin{bmatrix} 2 & -4 \\ -5 & 3 \end{bmatrix}$ then find $A + A'$ and AA'.

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6. If $A = \begin{bmatrix} -2 & -4 \\ 5 & 0 \\ -1 & 4 \end{bmatrix}, B = \begin{bmatrix} -2 & 3 & 1 \\ 4 & 0 & 2 \end{bmatrix}$ then find $2A + B' \& 3B' - A$.

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7. If $A = \begin{bmatrix} 2 & 0 & 1 \\ -1 & 1 & 5 \end{bmatrix}, B = \begin{bmatrix} -1 & 1 & 0 \\ 0 & 1 & -2 \end{bmatrix}$ then find (AB')'.

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8. If $A = \begin{bmatrix} 2 & -1 & 2 \\ 1 & 3 & -4 \end{bmatrix}$, and $B = \begin{bmatrix} 1 & -2 \\ -3 & 0 \\ 5 & 4 \end{bmatrix}$ then verify that `(AB)'

= B'A'.

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9. If $[(0, 2, 1)(-2, 0, -2), (-1, x, 0)]$ is a skew symmetric matrix then

find the value of x.

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10. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ 5 & -6 & x \end{bmatrix}$ det A = 45 then find x.

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11. Find the determinant of the matrix $\begin{bmatrix} 1^2 & 2^2 & 3^2 \\ 2^2 & 3^2 & 4^2 \\ 3^2 & 4^2 & 5^2 \end{bmatrix}$

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12. If ω is complex cube root of 1 then S.T $\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix} = 0$

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13. Find the rank of the matrix $\begin{bmatrix} 1 & 4 & -1 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$

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14. Find the rank of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

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15. If $\begin{bmatrix} x-3 & 2y-8 \\ z+2 & 6 \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ -2 & a-4 \end{bmatrix}$ then find x,y,z & a.

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16. IF $\begin{bmatrix} x-1 & 2 & 5-y \\ 0 & z-1 & 7 \\ 1 & 0 & a-5 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 7 \\ 1 & 0 & 0 \end{bmatrix}$. Then find the values of x,y,z and a.

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17. If $A = \begin{bmatrix} -1 & 3 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & 1 \\ 3 & -5 \end{bmatrix}, X = \begin{bmatrix} x_1 & x_2 \\ x_3 & x_4 \end{bmatrix}$ and $A + B = X$.

then find the values of x_1, x_2, x_3, x_4.

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18. If $A = \begin{bmatrix} 2 & 3 & 1 \\ 6 & -1 & 5 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 & -1 \\ 0 & -1 & 3 \end{bmatrix}$ then find the matrix X such that $A + B - X = 0$. What is the order of the matrix X?

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19. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \\ 4 & 5 & -6 \end{bmatrix}, B = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ then find B-A and $4A - 5B$.

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20. Find the additive inverse of A where $A = \begin{bmatrix} i & 0 & 1 \\ 0 & -i & 2 \\ -1 & 1 & 5 \end{bmatrix}$

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21. Find the trace of A, if $A = \begin{bmatrix} 1 & 2 & -1/2 \\ 0 & -1 & 2 \\ -1/2 & 2 & 1 \end{bmatrix}$

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22. Construct a 3×2 matrix whose elements are defined by $a_{ij} = \frac{1}{2}|i - 3j|$

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23. A certain book shop has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economics books. Their selling prices are Rs. 80, Rs. 60, Rs. 40 each respectively. Using matrix algebra, find the total value of the books in the shop.

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24. if $A = [(I, 0)(0, -i)]$ then show that $A^2 = -1(i^2 = -1)$.

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25. If $A = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$ then find A^2.

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26. Find the product $[-1, 4, 2]\begin{bmatrix} 5 \\ 1 \\ 3 \end{bmatrix}$

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27. Find the product $\begin{bmatrix} 2 & 1 & 4 \\ 6 & -2 & 3 \end{bmatrix}\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$

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28. If $A = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 & 0 \\ 1 & 0 & 4 \end{bmatrix}$, then find AB. Find BA if it exists.

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29. If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}, B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$ do AB and BA exist? If they exist, find them.

Do A and B commute with respect to multiplication?

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30. IF $A = \begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix}$ then find AA'. Do A and A' commute with respect to mulitplication of matrices?

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31. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & -2 \\ -1 & 0 \\ 2 & -1 \end{bmatrix}$ then find AB and BA.

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32. If $A = \begin{bmatrix} -2 & 1 & 0 \\ 3 & 4 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ 4 & 3 \\ -1 & 5 \end{bmatrix}$ then find $A + B^T$.

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33. If $A = \begin{bmatrix} 1 & 5 & 3 \\ 2 & 4 & 0 \\ 3 & -1 & -5 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 & 0 \\ 0 & -2 & 5 \\ 1 & 2 & 0 \end{bmatrix}$ then find $3A - 4B$.

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34. IF $A = \begin{bmatrix} 7 & -2 \\ -1 & 2 \\ 5 & 3 \end{bmatrix}, B = \begin{bmatrix} -2 & -1 \\ 4 & 2 \\ -1 & 0 \end{bmatrix}$ then find AB' and BA'

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35. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then show that AA'= A'A.

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36. Is $\begin{bmatrix} 0 & 1 & 4 \\ -1 & 0 & 7 \\ -4 & -7 & 0 \end{bmatrix}$ symmetric or shew symmetric?

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37. If $A = \begin{bmatrix} -1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & x & 7 \end{bmatrix}$ is symmetric, find value of x.

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38. If $\begin{bmatrix} 0 & 4 & -2 \\ -4 & 0 & 8 \\ 2 & -8 & x \end{bmatrix}$ is a skew symmetric matrix then find the value of x.

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39. Find the minors of -1 and 3 in the matrix $\begin{bmatrix} 2 & -1 & 4 \\ 0 & -2 & 5 \\ -3 & 1 & 3 \end{bmatrix}$

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40. Find the cofactors of 2 and -5 in the matrix $\begin{bmatrix} -1 & 0 & 5 \\ 1 & 2 & -2 \\ -4 & -5 & 3 \end{bmatrix}$

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41. Find the determinant of the matrix $\begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix}$

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42. Find the determinant of the matrix

$$\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$$

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43. P.T the determinant of skew symmetric matrix of order 3 is zero.

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44. Find the Adjoint and Inverse of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$

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45. Find the Adjoint and Inverse of the matrix $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

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46. If $A = \begin{bmatrix} a+ib & c+id \\ -c+id & a-ib \end{bmatrix}$, $a^2+b^2+c^2+d^2=1$, then find inverse of A.

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47. Find the rank of the matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

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48. Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

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49. Find the rank of the matrix $A = \begin{bmatrix} 1 & 0 & -4 \\ 2 & -1 & 3 \end{bmatrix}$

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50. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 6 \\ 2 & 4 & 3 \end{bmatrix}$

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51. Find the rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

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52. Define Trace of a matrix.

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53. What is transpose of a matrix?

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54. Define a diagonal matrix. Give one example.

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55. Define a scalar matrix, Give one example.

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56. Define symmetric & skew symmetric matrix and give and example to each.

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57. Define Rank of a matrix.

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58. For any square matrix A, show that AA' is symmetric.

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Very Short Questions 2 Marks Addition Of Vectors

1. Find the unit vector in the direction of the sum of the vectors

$\bar{a} = 2\bar{i} + 2\bar{j} - 5\bar{k}$ and $\bar{b} = 2\bar{i} + \bar{j} + 3\bar{k}$.

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2. Let $\bar{a} = 2\bar{i} + 4\bar{j} - 5\bar{k}, \bar{b} = \bar{i} + \bar{j} + \bar{k}, \bar{c} = \bar{j} + 2\bar{k}$. Find the unit vector in the opposite direction of a + b + c

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3. If $\bar{a} = 2\bar{i} + 5\bar{j} + \bar{k}$ and $\bar{b} = 4\bar{i} + m\bar{j} + n\bar{k}$ are collinear vectors then find m,n.

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4. If vectors $-3\bar{i}+4\bar{j}+\lambda\bar{k}, \mu\bar{i}+8\bar{j}+6\bar{k}$ are collinear vectors then find $\lambda \& \mu$.

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5. If the position vectors of the points A,B,C are $-2\bar{i}+\bar{j}-\bar{k}, -4\bar{i}+2\bar{j}+2\bar{k}, 6\bar{i}-3\bar{j}-13\bar{k}$ respectively and $\overline{AB}=\lambda\overline{AC}$ then find the value of λ.

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6. Let $\bar{a}, \bar{b}$ be non-collinear vectors. If $\alpha=(x+4y)\bar{a}+(2x+y+1)\bar{b}, \beta=(y-2x+2)\bar{a}+(2x-3y-1)\bar{b}$ are such that $3\alpha=2\beta$ then find x, y.

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7. Show that the points whose P,V are $-2\bar{a}+3\bar{b}+5\bar{c}, \bar{a}+2\bar{b}+3\bar{c}, 7\bar{a}-\bar{c}$ are collinear, where $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors.

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8. If $\overline{OA}=\bar{i}+\bar{j}+\bar{k}, \overline{AB}=3\bar{i}-2\bar{j}+\bar{k}, \overline{BC}=\bar{i}+2\bar{j}-2\bar{k}, \overline{CD}=2\bar{i}+\bar{j}+$ then find the vector $\overline{OD}$.

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9. Find the vectore equation of the line passing through the point $2\bar{i}+\bar{j}+3\bar{k}$ parallel to vector $4\bar{i}-2\bar{j}+3\bar{k}$.

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10. Find the vector equation of the line passing through the points $2\bar{i}+\bar{j}+3\bar{k},\ -\bar{i}+3\bar{j}-\bar{k}.$

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11. OABC is a parallelogram. If $\overline{OA}=\bar{a}, \overline{OC}=\bar{c}$ find the vector equation of the side $\overline{BC}$.

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12. Find the vector equation of the plane passing through the points $\bar{i}-2\bar{j}+5\bar{k},\ -5\bar{j}-\bar{k},\ -3\bar{i}+5\bar{j}.$

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13. Let $\bar{a}=\bar{i}+2\bar{j}+3\bar{k}$ and $\bar{b}=3\bar{i}+\bar{j}.$. Find a unit vector in the direction of $\bar{a}+\bar{b}$

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14. Find a vector in the direction of vector $\bar{a} = \bar{i} - 2\bar{j}$ has magnitude 7 units.

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15. Find unit vector in the direction of vector $\bar{a} = \left(2\bar{i} + 3\bar{j} + \bar{k}\right)$

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16. Write direction ratios of the vector $\bar{r} = \bar{i} + \bar{j} - 2\bar{k}$ and hence calculate its direction cosines.

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17. If α, β and γ be the angle made by the vector $3\bar{i} - 6\bar{j} + 2\bar{k}$ with the positive direction of the coordinate axes, then find $\cos\alpha, \cos\beta, \cos\gamma$.

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18. Find the angles made by the straight line passing through the points $(1, -3, 2)$ and $(3, -5, 1)$ with the corrdinate axes.

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19. Consider two points P and Q with position vectors $\overline{OP} = 3\bar{a} - 2\bar{b}$ and $\overline{OQ} = \bar{a} + \bar{b}$. Find the position vector of a point R which divides the line joining P and Q in the ratio 2:1

(i) internally.

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20. Consider two points P and Q with position vectors $\overline{OP} = 3\bar{a} - 2\bar{b}$ and $\overline{OQ} = \bar{a} + \bar{b}$. Find the position vector of a point R which divides the line joining P and Q in the ratio 2:1

externally.

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21. Show that the points $A(2\bar{i} - \bar{j} + \bar{k}), B(\bar{i} - 3\bar{j} - 5\bar{k}), C(3\bar{i} - 4\bar{j} - 4\bar{k})$ are the vertices of a right angled triangle.

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22. Show that the triangle formed by the vectors $3\bar{i} + 5\bar{j} + 2\bar{k}, 2\bar{i} - 3\bar{j} - 5\bar{k}, \ -5\bar{i} - 2\bar{j} + 3\bar{k}$ is equilateral.

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23. S.T the points whose P.V are $\bar{a} - 2\bar{b} + 3\bar{c}, 2\bar{a} + 3\bar{b} - 4\bar{c}, \ -7\bar{b} + 10\bar{c}$ are collinear.

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24. ABCDE is a pentagon. If the sum of the vectors $\overline{AB}, \overline{AE}, \overline{BC}, \overline{DC}, \overline{ED}, \overline{AC}$ is $\lambda\overline{AC}$ then find the value of λ.

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25. If $\bar{a}, \bar{b}, \bar{c}$ are P.V's of the vertices A,B,C respectively of ΔABC then find the vector equation of the median through the vertex A.

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26. Find the vector equation of plane passing through Points (0,0,0) , (0,5,0) and (2,0,1)

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Very Short Questions 2 Marks Product Of Vectors

1. Find the angle between the vectors $\vec{i} + 2\vec{j} + 3\vec{k}$ and $3\vec{i} - \vec{j} + 2\vec{k}$.

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2. If $|\bar{a} + \bar{b}| = |\bar{a} - \bar{b}|$ then find the angle between $\bar{a}$ and $\bar{b}$.

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3. If $\bar{a} = \bar{i} - \bar{j} - \bar{k}, \bar{b} = 2\bar{i} - 3\bar{j} + \bar{k}$ then find the projection vector of $\bar{b}$ on $\bar{a}$ and its magnitude.

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4. If $\bar{a} = \bar{i} + \bar{j} + \bar{k}, \bar{b} = 2\bar{i} + 3\bar{j} + \bar{k}$ then find the projection vector of $\bar{b}$ on $\bar{a}$ and its magnitude.

Watch Video Solution

5. If $\bar{a} = 2\bar{i} - \bar{j} + \bar{k}, \text{ and } \bar{b} = \bar{i} - 3\bar{j} - 5\bar{k}$ then find $|\bar{a} \times \bar{b}|$.

Watch Video Solution

6. Find a unit vector perpendicular to the plane containing the vector $\bar{a} = 4\bar{i} + 3\bar{j} - \bar{k}, \bar{b} = 2\bar{i} - 6\bar{j} - 3\bar{k}$

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7. Find the area of the parallelogram whose adjacent sides are $a = 2\bar{i} - 3\bar{j}, \bar{b} = 3\bar{i} - \bar{k}$

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8. Find the area of the parallelogram whose diagonals are $3\bar{i}+\bar{j}-2\bar{k}, \bar{i}-3\bar{j}+4\bar{k}$

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9. If $\bar{a}=6\bar{i}+2\bar{j}+3\bar{k}$ and $\bar{b}=2\bar{i}-9\bar{j}+6\bar{k}$, then find $\bar{a}.\bar{b}$ amd the angle between $\bar{a}$ and $\bar{b}$.

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10. If $\bar{a}=2\bar{i}+2\bar{j}-3\bar{k}, \bar{b}=3\bar{i}-\bar{j}+2\bar{k}$ then find the angle between $2\bar{a}+\bar{b}$ and $\bar{a}+2\bar{b}$.

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11. If $\bar{a} = \bar{i} - 2\bar{j} - 3\bar{k}, \bar{b} = 3\bar{i} - \bar{j} + 2\bar{k}$ then S.T $\bar{a} + \bar{b}. \bar{a} - \bar{b}$ are perpendicular.

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12. If vectors $\lambda\bar{i} - 3\bar{j} + 5\bar{k}, 2\lambda\bar{i} - \lambda\bar{j} - \bar{k}$ are perpendicular to each other find λ.

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13. If the vectors $2\bar{i} + \lambda\bar{j} - \bar{k}$ and $4\bar{i} - 2\bar{j} + 2\bar{k}$ are perpendicular to each other than find λ.

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14. For what values of λ the vectors $\bar{i} - \lambda\bar{j} + 2\bar{k}, 8\bar{i} + 6\bar{j} - \bar{k}$ are at right angles.

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15. Find the Cartesian equation of the plane passing through the point $(-2, 1, 3)$ and perpendicular to the vector $3\bar{i} + \bar{j} + 5\bar{k}$.

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16. Find the cartesian equation of the plane through the point $A(2, -1, -4)$ and parallel to the plane $4x - 12y - 3z - 7 = 0$.

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17. Find the angle between the planes $2x - 3y - 6z = 5$ and $6x + 2y - 9z = 4$

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18. Find anle between planes $\bar{r}.\left(2\bar{i}-\bar{j}+2\bar{k}\right)=3, \bar{r}.\left(3\bar{i}+6\bar{j}+\bar{k}\right)=4$

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19. If $\left|\overline{P}\right|=2, |\bar{q}|=3$ and $(\bar{p},\bar{q})=\frac{\pi}{6}$, then find $|\bar{p}\times\bar{q}|^2$

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20. If $\bar{a}=2\bar{i}-3\bar{j}+\bar{k}$ and $\bar{b}=\bar{i}+4\bar{j}-2\bar{k}$, then find $\left(\bar{a}+\bar{b}\right)\times\left(\bar{a}-\bar{b}\right)$

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21. Compute $\bar{a}\times\left(\bar{b}+\bar{c}\right)+\bar{b}\times\left(\bar{c}+\bar{a}\right)+\bar{c}\times\left(\bar{a}+\bar{b}\right)$

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22. If $\bar{p} = x\bar{i} + y\bar{j} + z\bar{k}$, find the value of $\left|\bar{p} \times \bar{k}\right|^2$

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23. Compute $2\bar{j} \times \left(3\bar{i} - 4\bar{k}\right) + \left(\bar{i} + 2\bar{j}\right) \times \bar{k}$.

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24. Find unit vector perpendicular to both $\bar{i} + \bar{j} + \bar{k}$ and $2\bar{i} + \bar{j} + 3\bar{k}$.

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25. If $\bar{a} = 2\bar{i} - 3\bar{j} + 5\bar{k}, \bar{b} = -\bar{i} + 4\bar{j} + 2\bar{k}$ then find $\bar{a} \times \bar{b}$ and unit vector perpendicular to both $\bar{a}, \bar{b}\left[-26\bar{i} - 9\bar{j} + 5\bar{k}, \pm\frac{1}{\sqrt{782}}26\bar{i} + 9\bar{j} - 5\bar{k}\right)$.

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26. Let $\bar{a} = 2\bar{i} - \bar{j} + \bar{k}, \bar{b} = 3\bar{i} + 4\bar{j} - \bar{k}$ and if θ is the angle between $\bar{a}, \bar{b}$ then find $\sin\theta$.

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27. If θ is the angle between the vectors $\bar{i} + \bar{j}, \bar{j} + \bar{k}$ then find $\sin\theta$.

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28. Find the area of the triangle having $(3\bar{i} + 4\bar{j}), (-5\bar{i} + 7\bar{j})$ as adjacent sides.

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29. If $\bar{a} = \bar{i} + 2\bar{j} + 3\bar{k}, \bar{b} = 3\bar{i} + 5\bar{j} - \bar{k}$ are 2 sides of a triangle, find its area.

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30. Find the area of the parallelogram whose adjacent sides are $\bar{a} = 2\bar{j} - \bar{k}, \bar{b} = -\bar{i} + \bar{k}$.

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31. Find the vector area and area of the parallelogram having $\bar{a} = \bar{i} + 2\bar{j} - \bar{k}, \bar{b} = 2\bar{i} - \bar{j} + 2\bar{k}$ as adjacent sides.

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32. Find the volume of the parallelopiped having co-tenninus edges are represented by the vectors $2\bar{i} - 3\bar{j} + \bar{k}, \bar{i} - \bar{j} + 2\bar{k}, 2\bar{i} + \bar{j} - \bar{k}$.

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33. Find the volume of the parallelopiped having co-tenninus edges are represented by the vectors $2\bar{i} - 3\bar{j} + \bar{k}, \bar{i} - \bar{j} + 2\bar{k}, 2\bar{i} + \bar{j} - \bar{k}$.

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34. Find the volume of the tetrahedron having the edges

,$\bar{i}+\bar{j}+\bar{k}, \bar{i}-\bar{j}, \bar{i}+2\bar{j}+\bar{k}$.

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35. Prove that vectors $\bar{a}=2\bar{i}-\bar{j}+\bar{k}, \bar{b}=\bar{i}-\overline{3j}-5\bar{k}$ and $\bar{c}=3\bar{i}-4\bar{j}-4\bar{k}$ are coplanar.

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36. If the vectors $\bar{a}=2\bar{i}-\bar{j}+\bar{k}, \bar{b}=\bar{i}+2\bar{j}-3\bar{k}, \bar{c}=3\bar{i}+p\bar{j}+5\bar{k}$ are coplanar then find p.

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37. Find t, for which the vectors $2\bar{i} - 3\bar{j} + \bar{k}, \bar{i} + 2\bar{j} - 3\bar{k}, \bar{j} - t\bar{k}$ are coplanar.

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38. if $\bar{a} + \bar{b} + \bar{c} = \bar{0}, |\bar{a}| = 3, |\bar{b}| = 5, |\bar{c}| = 7$ then find angle between $\bar{a}, \bar{b}$.

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39. If $4\bar{i} + \frac{2p}{3}\bar{j} + p\bar{k}$ is parallel to the vector $\bar{i} + 2\bar{j} + 3\bar{k}$, find p.

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40. If $|\bar{a}| = 13, |\bar{b}| = 5, \text{ and } \bar{a}.\bar{b} = 60$, then find $|\bar{a} \times \bar{b}|$.

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41. $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - 3\hat{j} - 5\hat{k}$. Find the vector $\vec{c}$ such that $\vec{a}$, $\vec{b}$ and $\vec{c}$ form the sides of a triangle.

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42. If $\bar{a} \times \bar{b} = \bar{b} \times \bar{c} \neq 0$, then show that $\bar{a} + \bar{c} = \bar{p}\bar{b}$, where p is some scalar.

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43. If $\bar{a}$, $\bar{b}$ and $\bar{a} - \sqrt{2}\bar{b}$ are unit vectors, then what is the angle between $\bar{a}$, $\bar{b}$?

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44. If $\bar{a}$, $\bar{b}$ are non-zero vectors such that $|\bar{a} + \bar{b}|^2 = |\bar{a}|^2 + |\bar{b}|^2$, then find the angle between $\bar{a}$, $\bar{b}$.

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45. If $|\bar{a}| = 2, |\bar{b}| = 3, |\bar{c}| = 4$ and each of $\bar{a}, \bar{b}, \bar{c}$ is perpendicular to the sum of the other two vectors, then find the magnitude of $\bar{a} + \bar{b} + \bar{c}$.

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46. $\bar{a}, \bar{b}, \bar{c}$ are pair wise non zero and non collinear vectors. If $\bar{a} + \bar{b}$ is collinear with $\bar{c}$ and $\bar{b} + \bar{c}$ is collinear with $\bar{a}$ then find vector $\bar{a} + \bar{b} + \bar{c}$.

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47. Find unit vector parallel to the XOY-plane and perpendicular to the vector $4\bar{i} - 3\bar{j} + \bar{k}$.

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48. Find the equation of the plane through the point $(3, -2, 2)$ and perpendicular to the vector $(4, 7, -4)$.

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49. For any vector $\bar{a}$ show that $|\bar{a} \times \bar{i}|^2 + |\bar{a} \times \bar{j}|^2 + |\bar{a} \times \bar{k}|^2 = 2|\bar{a}|^2$

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50. Show that $(\bar{a} + \bar{b}).\left[(\bar{b} + \bar{c}) \times (\bar{c} + \bar{a})\right] = 2\left[\bar{a}\bar{b}\bar{c}\right]$.

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51. If $\bar{a} = \bar{i} - 2\bar{j} + \bar{k}, \bar{b} = 2\bar{i} + \bar{j} + \bar{k}, \bar{c} = \bar{i} + 2\bar{j} - \bar{k}$, then find $\bar{a} \times (\bar{b} \times \bar{c})$ and $\left|(\bar{a} \times \bar{b}) \times \bar{c}\right|$.

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52. If $\bar{a}, \bar{b}, \bar{c}$ are mutually perpendicular unit vectors, then find $\left[\bar{a}\bar{b}\bar{c}\right]^2$.

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53. Show that $\left(\bar{a}+\bar{b}\right).\left[\left(\bar{b}+\bar{c}\right)\times\left(\bar{c}+\bar{a}\right)\right]=2\left[\bar{a}\bar{b}\bar{c}\right]$.

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54. Prove that $\bar{a}x\left[\bar{a}x\left(\bar{a}x\bar{b}\right)\right]=\left(\bar{a}.\,\bar{a}\right)\left(\bar{b}x\bar{a}\right)$.

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55. Find the value of $\left[\bar{i}+\bar{j}+\bar{k}, \bar{i}-\bar{j}, \bar{i}+2\bar{j}-\bar{k}\right]$.

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56. Ig $|\bar{a}| = 11, |\bar{b}| = 23, |\bar{a} - \bar{b}| = 30$ then find the angle between the vectors $\bar{a}, \bar{b}$ and also find $|\bar{a} + \bar{b}|$.

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57. If $\overline{P}, \overline{Q}, \overline{R}$ and $\overline{S}$ are points whose position vectors are $\bar{i} - \bar{k}, -\bar{i} + 2\bar{j}, 2\bar{i} - 3\bar{k}$ and $3\bar{i} - 2\bar{j} - \bar{k}$, then find component of $\overline{RS}$ on $\overline{PQ}$.

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58. Let $\bar{a} = 2\bar{i} + 3\bar{j} + \bar{k}, \bar{b} = 4\bar{i} + \bar{j}$ and $\bar{c} = \bar{i} - 3\bar{j} - 7\bar{k}$. Find the vector $\bar{r}$ such that $\bar{r}.\bar{a} = 9, \bar{r}.\bar{b} = 7$ and $\bar{r}.\bar{c} = 6$.

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59. Let $\overline{e_1}$ and $\overline{e_2}$ be unit vectors making angle θ. If $\frac{1}{2} \mid \overline{e_1} - \overline{e_2} = \sin \lambda\theta$, then find λ.

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60. Find the equation of the line passing through the point $2\bar{i} + 3\bar{j} - 4\bar{k}$ and parallel to the vector $6\bar{i} + 3\bar{j} - 2\bar{k}$ in cartesian form.

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61. If $\bar{a} = 2\bar{i} - 3\bar{j} + 5\bar{k}, \bar{b} = -\bar{i} + 4\bar{j} + 2\bar{k}$, then find $(\bar{a} + \bar{b}) \times (\bar{a} - \bar{b})$ and unit vector perpendicular to both $\bar{a} + \bar{b}$ and $\bar{a} - \bar{b}$

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62. If $\bar{a}\bar{b}\bar{c}$ and $\bar{d}$ are vectors such that $\bar{a} \times \bar{b} = \bar{c} \times \bar{d}$ and $\bar{a} \times \bar{c} = \bar{b} \times \bar{d}$. Then show that the vectors $\bar{a} - \bar{d}$ and $\bar{b} - \bar{c}$ are parallel.

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63. If $\bar{a}.\ \bar{b} = \bar{a}.\ \bar{c}$ and $\bar{a} \times \bar{b} = \bar{a} \times \bar{c}, \bar{a} \neq 0$, then show that $\bar{b} = \bar{c}$.

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64. Find the equation of the plane passing through the point A=(2,3,-1),B=(4,5,2),C=(3,6,5).

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65. Find the equation of the plane passing though the point $A = (3, -2, -1)$ and parallel to the vectors

$\bar{b} = \bar{i} - 2\bar{j} + 4\bar{k}$ and $\bar{c} = 3\bar{i} + 2\bar{j} - 5\bar{k}$.

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66. Find the distance of a point $(2, 5, -3)$ form plane $\bar{r}.\left(6\bar{i} - 3\bar{j} + 2\bar{k}\right) = 4$.

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67. Find the angle between line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane $10x + 2y - 11z = 3$

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68. Compute $\left[\bar{i} - \bar{j}.\ \bar{j} - \bar{k}.\ \bar{k} - \bar{i}\right]$.

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69. If $\bar{a} = \bar{i} - 2\bar{j} - 3\bar{k}, \bar{b} = 2\bar{i} + \bar{j} - \bar{k}, \bar{c} = \bar{i} + 3\bar{j} - 2\bar{k},$ compute $\bar{a}.\left(\bar{b} \times \bar{c}\right).$

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70. For non coplanar vector, $\bar{a}, \bar{b}$ and $\bar{c}$ determine p for which the vector $\bar{a} + \bar{b} + \bar{c}, \bar{a} + p\bar{b} + 2\bar{c}$ and $-\bar{a} + \bar{b} + \bar{c}$

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71. Determine λ, for which the volume of the parallelopiped having coterminus edges $\bar{i} + \bar{j}, 3\bar{i} - \bar{j}$ and $3\bar{j} + \lambda\bar{k}$ os 16 cubic units.

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72. If $\left[\bar{a} + 2\bar{b} 2\bar{b} + \bar{c} 5\bar{c} + \bar{a}\right] = k\left[\bar{a}\bar{b}\bar{c}\right]$

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73. Let $\bar{a}, \bar{b}$ be two non-collinear unit vectors, if $\overline{\alpha} = \bar{a} - (\bar{a}.\bar{b})\bar{b}$ and $\bar{\beta} = \bar{a} \times \bar{b}$, then show that $|\bar{\beta}| = |\overline{\alpha}|$.

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Very Short Questions 2 Marks Trigonometric Ratios Transformations

1. IF $\sin\theta = -\frac{1}{3}$ and θ does not lie in the 3rd quadrant, find the value of $\cos\theta$ and $\cot\theta$

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2. If $\sin\alpha + \text{cosec}\alpha = 2$, find value of $\sin^n\alpha + \text{cosec}^n\alpha, n \in Z$.

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3. S.T $\cot.\ \frac{\pi}{16}.\ \cot.\ \frac{2\pi}{16}.\ \cot.\ \frac{3\pi}{16}.....\ \cot.\ \frac{7\pi}{16} = 1$

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4. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$ then S.T $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

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5. Show that $\cos 340^\circ \cos 40^\circ + \sin 200^\circ \sin 140^\circ = \frac{1}{2}.$

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6. Find the value of $\tan 100^\circ + \tan 125^\circ + \tan 100^\circ . \tan 125^\circ .$

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7. Find the value of $\tan 10^\circ + \tan 35^\circ + \tan 10^\circ . \tan 35^\circ$

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8. Prove that $\tan 50^\circ - \tan 40^\circ - 2\tan 10^\circ$.

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9. Show that $\cos 42^\circ + \cos 78^\circ + \cos 162^\circ = 0$

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10. Prove that $\dfrac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \cot 36^\circ$

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11. Find the period of $f(x) = \cos\left(\dfrac{4x+9}{5}\right)$

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12. Find the value of $\cos^2 52\frac{1}{2}^\circ - \sin^2 22\frac{1}{2}^\circ$

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13. Find the period of $\tan\left(x + 4x + 9x + \ldots\ldots + n^2 x\right)$ (n any positive integer)

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14. Find a cosine function whose period is 7.

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15. Find a sine function whose period is $2/3$.

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16. Find the maximum and minimum value of $f(x) = 5\sin x + 12\cos x - 13.$

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17. Show that

$$\cot.\frac{\pi}{20}.\cot.\frac{3\pi}{20}.\cot.\frac{5\pi}{20}.\cot.\frac{7\pi}{20}.\cot.\frac{9\pi}{20} = 1$$

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18. Find the value of $\sin^2\frac{\pi}{10} + \sin^2\frac{4\pi}{10} + \sin^2\frac{6\pi}{10} + \sin^2\frac{9\pi}{10}.$

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19. Show that $\cos^2\frac{\pi}{10} + \cos^2\frac{4\pi}{10} + \cos^2\frac{6\pi}{10} + \cos^2\frac{9\pi}{10} = 2.$

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20. Evaluate $\cos^2 45^\circ + \cos^2 135^\circ + \cos^2 225^\circ + \cos^2 315^\circ$.

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21. If $\tan 20^\circ = \lambda$ then show that $\dfrac{\tan 160^\circ - \tan 110^\circ}{1 + \tan 160^\circ . \tan 110^\circ} = \dfrac{1 - \lambda^2}{2\lambda}$.

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22. If $\tan 20^\circ = p$ then prove that = $\dfrac{\tan 610^\circ + \tan 700^\circ}{\tan 560^\circ - \tan 470^\circ} = \dfrac{1 - p^2}{1 + p^2}$

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23. If $\sec\theta + \tan\theta = 2/3$, then find the value of $\sin\theta$ and determine the quadrant in which θ lies.

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24. If $\sec\theta + \tan\theta = 5$ then find $\sin\theta$ and determine the quadrant in which θ lies.

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25. If $\cos ec\theta + \cot\theta = 1/3$, then find $\cos\theta$ and determine the quadrant in which θ lies.

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26. If $a\cos\theta - b\sin\theta = c$, then show that $a\sin e\theta + b\cos = \pm\sqrt{a^2 + b^2 - c^2}$

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27. If $3\sin A + 5\cos A = 5$, then show that $5\sin A - 3\cos A = \pm 3$.

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28. If $3\sin A + 4\cos A = 5$, then find the value of $4\sin\theta - 3\cos\theta$.

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29. Show that $\sin 1140^\circ \cos 390^\circ - \cos 780^\circ \sin 750^\circ = 1/2$.

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30. Find the value of $\sin 330^\circ . \cos 120^\circ + \cos 210^\circ . \sin 300^\circ$.

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31. Simplify $\cos 100^\circ \cos 40^\circ + \sin 100^\circ \sin 40^\circ$.

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32. Show that

$$\sin 750^\circ \cos 480^\circ + \cos 120^\circ \cos 60^\circ = -\frac{1}{2}$$

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33. Prove that $\sin 780^\circ \sin 480^\circ + \cos 240^\circ . \cos 300^\circ = \frac{1}{2}$

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34. Find the value of $\tan 56^\circ - \tan 11^\circ - \tan 56^\circ . \tan 11^\circ$.

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35. Prove that $\tan 70^\circ - \tan 20^\circ = 2\tan 50^\circ$.

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36. Prove that $\tan 72^\circ = \tan 18^\circ + 2\tan 54^\circ$.

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37. Show that $\cos 35^\circ + \cos 85^\circ + \cos 155^\circ = 0$

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38. If $\tan\theta = \dfrac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$ and θ is the third quadrant find θ.

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39. Prove that $\sin^2 24^\circ - \sin^2 6^\circ$

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40. Find the value of $\sin^2 42^\circ - \sin^2 12^\circ$.

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41. Find the value of $\sin^2 82\frac{1}{2} - \sin^2 22\frac{1}{2}$.

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42. Prove that $\sin^2 52\frac{1}{2} - \sin^2 22\frac{1}{2}$.

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43. Prove that $\sin^2 42^\circ - \cos^2 78^\circ$.

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44. Find the value of $\cos^2 112\frac{1}{2} - \sin^2 52\frac{1}{2}$.

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45. Find the value of $\cos^2 72^\circ - \sin^2 54^\circ$.

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46. Find the value of $\cos^2 45^\circ - \sin^2 15^\circ$

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47. Find the period of $f(x) = \sin(5x + 3) \forall x \in R$.

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48. Find the period of $f(x) = \cos(3x + 5) + 7$

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49. Find the period of $\tan 5x$.

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50. Find the period of $f(x) = 2\sin\frac{\pi x}{4} + 3\cos\frac{\pi x}{3}$

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51. Find the period of $\cos^4 x$.

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52. Find the period of $f(x) = 2\sin\frac{\pi x}{4} + 3\cos\frac{\pi x}{3}$

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53. Find the period of $\frac{5\sin x + 3\cos x}{4\sin 2x + 5\cos x}$

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54. Find the period of the function $\sin^2 x + 2\cos^2 x$.

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55. Find maximum & minimum value of $3\sin x - 4\cos x$

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56. Find the maximum and minimum value of $24\sin x + 7\cos x$

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57. Find the range of $13\cos x + 3\sqrt{3}\sin x - 4$

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58. Find the range of $7\cos x - 24\sin x + 5$

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59. The minimum value of sin 2x - cos 2x is

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60. Find the extreme values of $\cos 2x + \cos^2 x$

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61. Find the extreme values of $3\sin^2 x + 5\cos^2 x$.

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62. Find the value of $\tan(855^\circ)$.

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63. Find the value of $\sec(2100^\circ)$

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64. Find the value of $\sec\left(13\frac{\pi}{3}\right)$

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65. Simplify $\cot\left(\theta - \frac{13\pi}{2}\right)$

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66. Simplify $\tan\left(-23\frac{\pi}{3}\right)$

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67. $\sin^2\frac{2\pi}{3} + \cos^2\frac{5\pi}{6} - \tan^2\frac{3\pi}{4} =$

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68. Find $\cos 225^\circ - \sin 225^\circ + \tan 495^\circ - \cot 495^\circ$.

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69. Find the value of $2\left(\sin^6\theta + \cos^6\theta\right) - 3\left(\sin^4\theta + \cos^4\theta\right)$

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70. Prove that $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta) = 2.$

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71. If $\dfrac{2\sin\theta}{1 + \cos\theta + \sin\theta} = x,$ find the value of $\dfrac{1 - \cos\theta + \sin\theta}{1 + \sin\theta}$

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72. Show that $\cos^4\alpha + 2\cos^2\alpha\left(1 - \frac{1}{\sec^2\alpha}\right) = (1 - \sin^4\alpha)$

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73. Prove that $(\tan\theta + \cot\theta)^2 = \sec^2\theta + \operatorname{cosec}^2\theta = \sec^2\theta.\ \operatorname{cosec}^2\theta.$

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74. Prove that $\sin^2\alpha + \cos^2(\alpha + \beta) + 2\sin\alpha\sin\beta\cos(\alpha + \beta)$ is independent of α.

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75. If $\cos\theta > 0, \tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n,$ then show that $m^2 - n^2 = 4\sqrt{mn}$

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76. For what values of x in the first quadrant $\frac{2\tan x}{1-\tan^2 x}$ is positive ?

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77. If A, B, C are angles of a cyclic quadrilateral prove that $\cos A + \cos B + \cos C + \cos D = 0$

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78. If A, B, C, D are angles of a cyclic quadrilateral then P.T $\sin A - \sin C = \sin D - \sin B.$

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79. If α, β are complementry angles such that $b\sin\alpha = a$, the find the value of $(\sin\alpha\cos\beta - \cos\alpha\sin\beta).$

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80. Find the expansion of $\sin(A+B+C)$.

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81. Prove that $\sin^2\left(\frac{\pi}{8}+\frac{A}{2}\right)-\sin^2\left(\frac{\pi}{8}-\frac{A}{2}\right)=\frac{1}{\sqrt{2}}\sin A.$

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82. Express $\cos^6 A+\sin^6 A$ interms of $\sin 2A$.

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83. Simplify $\tan\left(\frac{\pi}{4}+A\right)\tan\left(\frac{\pi}{4}-A\right)$

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84. Prove that $\tan 3A.\ \tan 2A.\ \tan A = \tan 3A - \tan 2A - \tan A$

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85. Find $\tan 20^\circ + \tan 40^\circ + \sqrt{3}\tan 20^\circ \tan 40^\circ$.

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86. Prove that $\dfrac{\sin\theta + \sin 2\theta}{1 + \cos 0 + \cos 2\theta} = \tan\theta$

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87. Express $\dfrac{1 - \cos\theta + \sin\theta}{1 + \cos\theta + \sin\theta}$ in terms of $\tan\theta/2$.

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88. Simplify $\dfrac{\cot 55^\circ \cot 35^\circ - 1}{\cot 55^\circ + \cot 35^\circ}$

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89. Express $\frac{\left(\sqrt{3}\cos 25^\circ + \sin 25^\circ\right)}{2}$ as a sine of an angle.

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90. Expres $\sqrt{3}\sin 0 + \cos 0$ as a sine of an angle .

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91. Express $(\cos\theta - \sin\theta)$ as a cosine of an angle.

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92. Express $\tan\theta$ in terms of $\tan\alpha, \quad \text{if} \quad \sin(\theta+\alpha) = \cos(\theta+\alpha).$

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93. Evaluate $6\sin 20^\circ - 8\sin^3 20^\circ$.

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94. Prove that $\dfrac{\sin 70^\circ - \cos 40^\circ}{\cos 50^\circ - \sin 20^\circ} = \dfrac{1}{\sqrt{3}}$.

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95. Prove that $\sin 78^\circ + \cos 132^\circ = \dfrac{\sqrt{5}-1}{4}$.

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96. Prove that $\sin 21^\circ \cos 9^\circ - \cos 84^\circ \cos 6^\circ = \dfrac{1}{4}$.

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97. Find the value of $\sin 34^\circ + \cos 64^\circ - \cos 4^\circ$

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98. Prove that $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$

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99. Prove that $4(\cos 66^\circ + \sin 84^\circ) = \sqrt{3} + \sqrt{15}.$

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100. Prove that $\cos 20^\circ \cos 40^\circ - \sin 5^\circ \sin 25^\circ = \frac{\sqrt{3}+1}{4}.$

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101. Prove that $\cos\theta + \cos\left[\frac{2\pi}{3} + \theta\right] + \cos\left[\frac{4\pi}{3} + \theta\right] = 0.$

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102. Prove that $\cos A + \cos\left(\frac{4\pi}{3} - A\right) + \cos\left(\frac{4\pi}{3} + A\right) = 0.$

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103. Find the value of $\sin 22\left(\frac{1}{2}\right)^{\circ}$

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104. Find the value of $\sin 75^{\circ}$

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105. Find the value of $\tan 75^{\circ}$

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106. Find the value of $\tan 75^{\circ} + \cot 75^{\circ}$

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107. Find the values of $\cos 22\left(\frac{1}{2}\right)^{\circ}$ using the value of cos 45°?

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108. Find the values of $\tan 22\left(\frac{1}{2}\right)^{\circ}$

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109. Find the values of $\sin 36^{\circ}$

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110. Find the value of $\cos 18^{\circ}$

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111. If $\cos A = \sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}$, find the value of $\cos 2A$

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112. IF $\sin\theta = \frac{4}{5}$ and θ is not in the first quadrant, find the value of $\cos\theta$.

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113. If $\cos\theta = t(0 < t < 1)$ and θ does not lies in the first quadrent , find $\sin\theta$ and $\tan\theta$.

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114. If $\cos\theta = t(0 < t < 1)$ and θ does not lies in the first quadrent , find $\sin\theta$ and $\tan\theta$.

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115. If $\sin A = \frac{12}{13}, \cos B = \frac{3}{5}$ and neither A nor B is in the first quadrant, then find the quadrant in which A+B lies.

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116. If $0 < A, B < 90^\circ, \cos A = \frac{5}{13}$ and $\sin B = \frac{4}{5}$ then find $\sin(A + B)$.

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117. If $\sin = \frac{1}{\sqrt{10}}, \sin\beta = \frac{1}{\sqrt{5}}$ and α, β are acute, show that $\alpha + \beta = \pi/4$

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118. If $\cos\theta = \frac{-5}{13}$ and $\frac{\pi}{2} < \theta < \pi,$ find the value of $\sin 2\theta$

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119. If $0 < A < \pi/4$ and $\cos A = 4/5$, then find the values of $\sin 2A$ and $\cos 2A$

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120. If $\cos\theta = \frac{5}{13}$ and $270^\circ < \theta < 360^\circ$, evaluate $\sin(\theta/2)$ and $\cos(\theta/2)$

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121. If $\sin\alpha = \frac{3}{5}$, where $\frac{\pi}{2} < \alpha < \pi$, evaluate $\cos 3\alpha$ and $\tan 2\alpha$.

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122. If $\cos 0 = \frac{-3}{5}$ and $\pi < 0 < \frac{3\pi}{2}$, find the value of $\tan\theta/2$

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123. If $0 < A < B < \frac{\pi}{4}$ and $\sin(A+B) = \frac{24}{25}$ and $\cos(A-B) = \frac{4}{5}$, then find the value of $\tan 2A$.

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124. If $A+B, A$ are acute angles such that $\sin(A+B) = \frac{24}{25}$ and $\tan A = \frac{3}{4}$, then find the value of $\cos B$.

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125. If $\tan(\alpha - \beta) = \frac{7}{24}$ and $\tan\alpha = \frac{4}{3}$, where α, β are in first quadrant P.T $\alpha + \beta = \pi/2$

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126. In a ΔABC, A is obtuse. If $\sin A = \frac{3}{5}$ and $\sin B = \frac{5}{13}$, then show that $\sin C = \frac{16}{65}$

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127. If $\cos A = \cos B = -\frac{1}{2}$ and A does not lie in the second quadrant and B does not lie in the third quadrant, then find the value of $\frac{4\sin B - 3\tan A}{\tan B + \sin A}$

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128. If $8\tan A = -15$ and $25\sin B = -7$ and neither A nor B is in the fourth quadrant, then show that $\sin A\cos B + \cos A\sin B = \frac{-304}{425}$.

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129. If $0^\circ < A, B < 90^\circ$, such that $\cos A = \frac{5}{13}, \sin B = \frac{4}{5}$, find $\sin(A - B)$.

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130. If $\cos \alpha = \frac{-3}{5}$ and $\sin \beta = \frac{7}{25}$ where $\frac{\pi}{2} < \alpha < \pi$ and $0 < \beta < \frac{\pi}{2}$ then find the values of $\tan(\alpha + \beta)$ and $\sin(\alpha + \beta)$.

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131. If $\cos A = \frac{7}{25}$ and $\frac{3\pi}{2} < A < 2\pi$, then find the value of $\cot A/2$.

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132. If $0 < \theta < \frac{\pi}{8}$, show that $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 4\theta}}}$ = 2 cos (theta//2)`

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133. Evaluate $\sum \frac{\sin(A+B)\sin(A-B)}{\cos^2 A \cos^2 B}$: if non of $\cos A$, $\cos B$, $\cos C$ is zero.

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134. If $\tan^2\theta = (1-e^2)$ show that $\sec\theta + \tan^3.\ \text{cosec}\theta = (2-e^2)^{3/2}$.

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135. Express $\frac{\sin 4\theta}{\sin\theta}$ in terms of $\cos^3\theta$, $\cos\theta$.

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136. For what values of A in the first quardrant, the expression $\frac{\cot^3 A - 3\cot A}{3\cot^2 A - 1}$ is positive?

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137. Prove that $\frac{\cos 3A + \sin 3A}{\cos A - \sin A} = 1 + 2\sin 2A.$

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138. If $a \leq \cos\theta + 3\sqrt{2}\sin\left[\theta + \frac{\pi}{4}\right] + 6 \leq b$, find largest value of a and smallest value of b.

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Very Short Questions 2 Marks Hyperbolic Functions

1. Prove that $\sinh(3x) = 3\sinh x + 4\sinh^3 x,\ \forall x \in R$

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2. Prove that $(\cosh x - \sinh x)^n = \cosh(nx) - \sinh(nx)$

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3. IF sinhx=$3/4$ then find cosh2x and sinh2x.

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4. If $\cosh x = 5/2$, then find the values of

$\cosh(2x)$

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5. If $\cosh x = 5/2$, then find the values of

$\sinh(2x)$

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6. If $\sinh x = 3$ then show that $x = \log(3 + \sqrt{10})$

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7. S.T $\frac{\tanh^{-1} 1}{2} = \frac{1}{2}\log_e 3.$

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8. If $\cosh x = \sec\theta$ then prove that $\tanh^2 . \frac{x}{2} = \tan^2 . \frac{\theta}{2}$

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9. Prove that $\cosh^2 x - \sinh^2 x = 1$

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10. P.T $\cosh^2 x + \sinh^2 x = \cosh 2x$

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11. Prove that $\cosh^4 x - \sinh^4 x = \cosh 2x$

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12. Prove that $\cosh 3x = 4\cosh^3 x - 3\cosh x$

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13. P.T $\tanh 3x = \dfrac{3\tanh x + \tanh^3 x}{1 + 3\tanh^2 x}, \forall x \in R$

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14. Prove that $(\cosh x + \sinh x)^n = \cosh(nx) + \sinh(nx)$

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15. If $\cosh x = 3/2,$ then find the value of (i) $\sinh 2x$ (ii) $\cosh 2x$

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16. If $\cosh x = 3/2,$ then find the value of (i) $\sinh 2x$ (ii) $\cosh 2x$

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17. If $\sinh x = 5, \quad \text{then S.T} \quad x = \log_e\left(5 + \sqrt{26}\right)$

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18. If $\tanh x = 1/4, \quad \text{then prove that} \quad x = \frac{1}{2}\log_e\left(\frac{5}{3}\right)$

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19. Prove that $\sinh(x - y) = \sinh x \cosh y - \cosh x \sinh y.$

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20. Prove that $\sinh(x+y) = \sinh x \cosh y + \cosh x \sinh y$

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21. Prove that $\tanh(x-y) = \dfrac{\tanh x - \tanh y}{1 - \tanh x \tanh y}$

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22. Prove that $\coth(x-y) = \dfrac{\coth x . \coth y - 1}{\coth y - \coth x}$

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23. $\dfrac{\cosh \text{x}}{1 \text{ -tanhx}} + \dfrac{\sinh \text{x}}{1 \text{ - coth x}} =$

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