MATHS

BOOKS - UNITED BOOK HOUSE

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Exercise

1. If A and B are disjoint sets,then

A. a)$A \times B \subset B \times A$

B. b)$B \times A \subset A \times B$

C. c)$A \times B = B \times A$

D. d)$A \times B \text{ and } B \times Aaredisj\oint$

Answer:

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2. The domain for which the fucntions defined by $f(x) = 3x^2 - 1$and g(x)=3+x are equal is

A. a){-+1,4/3}

B. b)(-1,4/3)

C. c)[-1,4/3]

D. d)none of these.

Answer:

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3. A value of θ lying between 0 and 2pie ,which satisfies $\cot\theta = \frac{1}{\sqrt{3}}$and $\cos ec\theta = -\frac{2}{\sqrt{3}}$is

A. a) $\left(\frac{4\pi}{3}\right)$

B. b) $\frac{\pi}{3}$

C. c)((2pi)/3)`

D. d) $\left(\frac{5\pi}{3}\right)$

Answer:

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4. IF x and be are real numbers and b>0,|x|>b then

A. a) $x \in (-+b, \infty)$

B. b) $x \in (-\infty, b)$

C. c) $x \in (b, b)$

D. d) $x \in (-\infty, b) \cup (b, \infty)$

Answer:

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5. If z_1 and z_2 are any two complex numbers,then which of the following is not true

A. a)$|z_1 + z_2| \leq |z_1| + |z_2|$

B. b)$|z_1 - z_2| \leq |z_1| + |z_2|$

C. c)$|z_1 - z_2| \geq |z_1| - |z_2|$

D. d)$|z_1| - |z_2| \geq |z_1 - z_2|$

Answer:

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6. The values of $\sqrt{3}\cos ec20^\circ - \sec 20^\circ$ is equal to

A. a)$\frac{4\sin 20^\circ}{\sin 40^\circ}$

B. b)$\frac{2\sin 20^\circ}{\sin 40^\circ}$

C. c)4

D. d)2

Answer:

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7. The intercept cut off by a line from y-axis is twice that from x-axis and the line passes throught the point (1,2) .The equation of the line is

A. a)2x+y+4=0

B. b)2x+y=4

C. c)2x-y=4

D. d)2x-y+4=0

Answer:

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8. Number of diagonals of a convex hexagon is

A. a)3

B. b)6

C. c)9

D. d)12

Answer:

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9. If A and B are any two events having $P(A \cup B) = 1/2$and $P\left(\overline{A}\right) = \frac{2}{3}$,then $P\left(\overline{A} \cap B\right)$is

A. a)$1/2$

B. b)2/3

C. c)1/3

D. d)1/6

Answer:

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10. Standard deviation of first 10 natural numbers is

A. a)5.5

B. b)3.87

C. c)2.97

D. d)2.87

Answer:

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11. For any two sets, show that $(A \cap B) \cup (A - B) = A$.

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12. Let X={0,-1,1,2,-2}and Y={0,1,2,3,4,6}f:$X \to Y$be defined as $f(x) = x^2 + x$for all $x \in X$ find the range of f.also find f(A) where A= {0,-1,-2}.

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13. Prove that $\sin x + \sin y + \sin z - \sin(x + y + z) = 4\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{y+z}{2}\right)\sin\left(\frac{z}{}\right.$

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14. Prove that $\sin\left(\frac{\pi}{14}\right)\sin\left(\frac{3\pi}{14}\right)\sin\left(\frac{5\pi}{14}\right) = \frac{1}{8}$

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15. Solve :$|z| = z + \overline{1 - 2i}$

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16. In how many of the distinct permutaions of the letters in MISSISIPPI do the four is I's not come together?

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17. Solve :$x^2 - \left(3\sqrt{2} - 2i\right)x - 6\sqrt{2}i = 0$

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18. For any complex number z,prove that $|Re(z)| + |I_m(z)| \leq \sqrt{2}|z|$

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19. Find the direction in which a straight line must be drawn through the point $(-1, 2)$ so that its point of intersection with the line $x + y = 4$ may be at a distance of 3 units from this point.

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20. Find the area of the triangle formed by the lines joingn the vertex of the parabola $x^2 = 24y$to the ends of its latus rectum .

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

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22. Prove that $(A \cup B)^c = A^c \cap B^c$[without venn-diagram]

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23. Four digit number are formed by using the digits 1,2,3,4 and 5 wihout repeating any digit.Find the probability that a number chosen at random is an odd number.

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24. Find the mean deviation about the median for the following data:

x_i	3	6	9	12	13	15	21	22
f_i	3	4	5	2	4	5	4	3

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25. For any three sets A, B, C, Prove that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

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26. $A+B+C=\pi$,prove that $\sin^2\left(\frac{A}{2}\right)+\sin^2\left(\frac{B}{2}\right)+\sin^2\left(\frac{C}{2}\right)=1-2\sin\left(\frac{A}{2}\right)\sin\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$

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27. Solve :$\tan x+\tan\left(x+\frac{\pi}{3}\right)+\tan\left(x+\frac{2\pi}{3}\right)=3$

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28. Using the principle of mathematical induction prove that $3^{2n+1}+2^{n+2}$is divisible by $7[n\in N]$

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29. If α and β are different complex numbers with $|\beta|=1$, then find $\left|\frac{\beta-\alpha}{1-\overline{\alpha}\beta}\right|$

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30. A question paper contains 12 questions divided into three parts.Parts A contains 6 questions while B and C contains 3 questions each.A candidate is required to attempt 6 questions selecting at least two from part A and atleast one from each of the parts B and C.In how many ways can the candidate select 6 questions?

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31. Prove that the inequations $\frac{2x+1}{7x-1} > 5$and $\frac{x+7}{x-8} > 2$have no solutions

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32. Exhibit graphically the solution region of the following system of 'inequations :$2x + y \geq 4$,$x + y \leq 3$,$2x - 3y \leq 6$,x>0,y>0

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33. Prove that the product of the lengths of the perpendiculars drawn from the points $\left(\sqrt{a^2-b^2}, 0\right)$ and $\left(-\sqrt{a^2-b^2}, 0\right)$ to the line $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ is b^2.

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34. Find the equation of a circle which touches both the axes and the line 3x-4y+8=0 and which lies in the third quadrant.

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35. The focus of a parabola is (1,5)and its directrix is x+y+2=0.Find the equation of parabola.Find its vertix and length of latus rectum.

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36. $3(1-x) < 2(x+4)$

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37. Prove that every function can be expressed as the sum of an -even and an odd function.

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38. A,B,C are three finite sets such that n(A)=17,n(B)=13,n(C)=15, $n(A \cap B) = 9$,$n(B \cap C) = 4$,$n(C \cap A) = 5$and n(S)=50, $n(A \cap B \cap C) = 3$.find $n(A \cap B^c \cap C^c)$,$n(B \cap A^c \cap C^c)$, $n(C \cap A^c \cap B^c)$,$n(A \cap B \cap C)^c$

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39. Draw the graph of f(x)=|x-1|+|x-2|.

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40. Whats is the probability of arrangement of the letters of the word SOCIETY so that three vowels come together?.

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41. The mean and standard deviation of 100 observations were calculated as 40 and 5.1, respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean and standard deviation?

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42. Prove that $\tan 6^\circ \tan 42^\circ \tan 66^\circ \tan 78^\circ = 1$

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43. Solve :$\cos 3x + \cos 2x = \sin\left(\frac{3x}{2}\right) + \sin\left(\frac{x}{2}\right), (0 \leq x \leq \pi)$

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44. if $\frac{1-ix}{1+ix} = a - ib$,then prove that $a^2 + b^2 = 1$(a,b x are real).

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45. Solve graphically : $|x - y| \geq 3$.

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46. How many different numbers of 4 digits each can be formed with the digits9,9,5,5,,3,3,,4,6.

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47. Solve : $12x^4 - 56x^3 + 89x^2 - 56x + 12 = 0$

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48. Show that the area of the triangle formed by the lines $y = m_1x + c_1, y = m_2x + c_2$ and $x = 0$ is $\frac{(c_1 - c_2)^2}{2|m_1 - m_2|}$

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49. Find the equation of the circle described on the common chord of the circles $x^2 + y^2 - 4x - 5 = 0$ and $x^2 + y^2 + 8x + 7 = 0$ as diameter.

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50. Show that the sum of the reciprocals of the segments of any focal chord of a parabola $y^2 = 4ax$is constant.

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51. If $2x^4 - 7x^3 + ax + b$ is divisible by (x - 3), then the relation between a and b is

A. 3b + a = 27

B. 3a + b = 27

C. 3a + b = -27

D. 3b + a = -27

Answer:

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52. The AM of 1,2,.....,n with frequencies 1^2, 2^2,.....n^2 respectively is

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53. All order raw moments are affected by the change of

A. base only

B. scale only

C. both base and scale

D. none of these

Answer:

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54. A negative coefficient of skewness implies that

A. mean $>$ median

B. mean $<$ median

C. mean = median

D. none of these

Answer:

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55. The values of $\Delta\left\{\frac{f(x)}{g(x)}\right\}$ is

A. a) $\frac{f(n+h)}{g(x+h)}$

B. b) $\frac{f(x+h)-f(x)}{g(x+h)-g(x)}$

C. c) $\frac{g(x)\Delta f(x)-f(x)\Delta g(x)}{g(x)g(x+h)}$

D. d) $\frac{g(x+h)f(x+h)-g(x)f(x)}{g(x+h)f(x+h)}$

Answer:

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56. The H.M of 7 values 1/2, 1/3, 1/4, 1/5, 1/6, 1/7 and 1/8 is

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57. If the relationship between two variables y and v is v - 3y = 6 and S.D. of y is 2, then the variance of v is.....(fill in the blank)

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58. Numerically the measure of skewness in terms of quartiles cannot exceed 1 (write True or false)

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59. Find the standard deviation of the following quantities: 5, 5, 5, 7, 7, 7

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60. State Remainder theorem.

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61. What do you mean by C_4 cycle? Show C_4 cycle with the help of word digram.

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62. What is the condition that the roots of the equation $x^3 + px^2 + qx + r = 0$ are in G.P.

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63. If $x^4 + 5x^3 + 4x^2 + 8x + 24$ is divided by (x + 2), then find the remainder.

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64. What do you mean by primary data?

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65. Define the term schedule.

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66. Find out derivative of $\left(3x^2 + 5x + 78\right)$

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67. Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that

(i) all the five cards are spades?

(ii) only 3 cards are spades?

(iii) none is a spade?

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68. If $iz^3 + z^2 - z + i = 0$ then the value of $|z|$ is

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69. What are the merits of arithmetic mean?

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70. Write notes on : Relative dispersion and its measures.

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71. If Y = a + bx, a, b be two real constants, then prove that Range (y) = |b|, Range (x).

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72. Prove that $\log_n(n+1) > \log_{n+1}(n+2)$, for n > 1.

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73. Show that for any set of n real values $x_1, x_2, \ldots\ldots x_n$.

$$x_1^2 + x_2^2 + \ldots\ldots + x_n^2 \geq \frac{x_1 + x_2 + \ldots\ldots + x_n}{\sqrt{n}}$$

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74. State Remainder theorem.

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75. If a, b, c are all positive, prove that $6abc \leq bc(b+c) + ca(c+a) + ab(a+b)$

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76. Find the degree two polynomial function f(x) for which it is known that f(0) = 1, f(1) = 5, f(2) = 11.

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77. If a variable assumes n values a, ar,.....ar^{n-1} (r < 1) with equal frequencies then verify that $AH = G^2$

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78. Write a short note on histogram of a frequency distribution.

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79. Write down the merits and demerits of mass questionnaire method.

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80. if $\sin^4 x + \sin^2 x = 1$,then prove that $\cot^4 x + \cot^2 x$=1.

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81. Two groups of 15 and 22 values have variances 9 and 16 respectively. If the group means differ by 8.2, then find the standard deviation of the combined group of values.

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82. Write a general formula expressing central moments in terms of raw moments.

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83. If s and R are respectively the standard deviation and range of set of n values of a variable x, then prove that $\frac{R^2}{2n} \leq s^2$.

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84. If $\bar{x}_1$ and $\bar{x}_2$ are the A.M. of two sets with n_1 and n_1 observation respectively, then prove that combined mean for two sets $(\bar{x})$ lies between $\bar{x}_1$ and $\bar{x}_2$.

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85. Derive the formula of median from ogive for a frequency distribution.

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86. Prove that all odd-ordered central moments are zero for a symmetrical distribution.

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87. Derive Lagrange's interpolation formula.

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88. Prove that $\frac{1}{n}\sum_{E_1}^{n}|x_i - A|$ attains, minimum when A = Median.

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89. If the mean and variance of one set of values be $\bar{x}_1$ and s_1^2 and those of another set be $\bar{x}_2$ and s_2^2 respectively and each set has values 2, then prove that the variance $\left(s^2\right)$ of the combined set of values is given by $4s^2 = 2\left(s_1^2 + s_2^2\right) + d^2$ where $d = (\bar{x}_1 - \bar{x}_2)$.

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90. In a frequency table, the upper boundary of each class-interval has a constant ratio to the lower boundary. Show that the geometric mean (G) may be expressed as $\log G = A + \frac{k}{n}\sum_{i=1}^{r} f_i(i-1)$.

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