MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

INCREASING AND DECREASING FUNCTION

Others

1. Show that $f(x) = (x-1)e^x + 1$ is an increasing function for all $x > 0$.

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2. Find the intervals in which $f(x)$ is increasing or decreasing:

(1). $f(x) = x|x|, x \in R$

(2). $f(x) = \sin x + |\sin x|, 0 < x \leq 2\pi$

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3. Show that $f(x) = x^3 - 15x^2 + 75x - 50$ is an increasing function for all $x \in R$

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4. Show that $f(x) = \cos^2 x$ is decreasing function on $\left(0, \frac{\pi}{2}\right)$.

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5. Show that $f(x) = x^2 - x \sin x$ is an increasing function on $\left(0, \frac{\pi}{2}\right)$.

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6. Show that $f(x) = \cos x$ is decreasing function on $(0, \pi)$, increasing in $(-\pi, 0)$ and neither increasing nor decreasing in $(-\pi, \pi)$.

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7. Show that $f(x) = \tan^{-1}(\sin x + \cos x)$ is decreasing function on the interval $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$.

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8. Show that function $f(x) = \sin\left(2x + \frac{\pi}{4}\right)$ is decreasing on $\left(\frac{3\pi}{8}, \frac{5\pi}{8}\right)$.

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9. Show that $f(x) = x - \sin x$ is increasing for all x in R

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10. Find the value(s) of a for which $f(x) = x^3 - ax$ is an increasing function on R.

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11. Find the intervals in which function f(x) = $\sin x - \cos x, 0 < x < 2\pi$ is (i) increasing, (ii) decreasing.

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12. Determine the values of x for which the function $f(x) = x^2 - 6x + 9$ is increasing, or decreasing. Also, find the coordinates of the point on the curve $y = x^2 - 6x + 9$ where the normal is parallel to the line $y = x + 5$.

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13. Find the intervals in which the following function are increasing or decreasing. $f(x) = 10 - 6x - 2x^2$

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14. Show that $f(x) = e^{\frac{1}{x}}, x \neq 0$ is decreasing function for all $x \neq 0$.

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15. Show that $f(x) = e^{2x}$ is increasing on R.

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16. Show that $f(x) = x^9 + 4x^7 + 11$ is an increasing function for all $x \in R$.

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17. State when a function $f(x)$ is said to be increasing on an interval $[a, b]$. Test whether the function $f(x) = x^2 - 6x + 3$ is increasing on the interval $[4, 6]$.

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18. Determine whether $f(x) = -x/2 + \sin x$ is increasing or decreasing on $(-\pi/3, \pi/3)$.

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19. Show that $f(x) = \tan^{-1} x - x$ is decreasing function on R.

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20. Find the intervals in which $f(x) = (x+2)e^{-x}$ is increasing or decreasing.

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21. Prove that the function f given by $f(x) = x - [x]$ us increasing in $(0, 1)$.

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22. Show that the function f given by $f(x) = 10^x$ is increasing for all x.

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23. Without using the derivative, show that the function $f(x) = |x|$ is strictly increasing in $(0, \infty)$ strictly decreasing in $(-\infty, 0)$.

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24. Without using the derivative show that the function $f(x) = 7x - 3$ is strictly increasing function on R.

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25. Prove that the function $f(x) = (\log)_a x$ is increasing on $(0, \infty)$ if $a > 1$ and decreasing on $(0, \infty)$, if $0 < a < 1$

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26. Prove that $f(x) = ax + b$, where a, b are constants and $a > 0$ is an increasing function on R.

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27. Prove that the function $f(x) = (\log)_e x$ is increasing on $(0, \infty)$.

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28. Show that $f(x) = \frac{1}{1 + x^2}$ decreases in the interval $[0, \infty)$ and increases in the interval $(-\infty, 0]$.

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29. Show that $f(x) = \frac{1}{x}$ is decreasing function on $(0, \infty)$.

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30. $Solve: \frac{1 - x^2}{5x - 6 - x^2} < 0$

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31.

$solve: \frac{1}{x+1} - \frac{4}{(2+x)^2} > 0, x \neq -1, -2$

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32. Find $\frac{dy}{dx}$ if $x^2 = \sin y$

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33. Find the intervals in which the function $f(x) = 2x^3 + 9x^2 + 12x + 20$ is (i) increasing (ii) decreasing

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34. Find the intervals in which $f(x) = -x^2 - 2x + 15$ is increasing or decreasing.

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35. $Solve: \frac{x^2 - 4x + 7}{x^2 - 7x + 12} \leq \frac{2}{3}.$

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36. $Solve \frac{8x^2 + 16x - 51}{2x^2 + 5x - 12} > 3$

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37. Determine the values of x for which $f(x) = x^x, x > 0$ is increasing or decreasing.

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38. Show that $f(x) = 2x + \cot^{-1} x + \log\left(\sqrt{1 + x^2} - x\right)$ is increasing in R

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39. Find the intervals in which the function $f(x) = x^4 - \frac{x^3}{3}$ is increasing or decreasing.

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40. Find the intervals in which $f(x) = \frac{x}{\log x}$ is increasing or decreasing.

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41. Show that $f(x) = \cos\left(2x + \frac{\pi}{4}\right)$ is an increasing function on $(3\pi/8, 7\pi/8)$.

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42. Show that for $a \geq 1, f(x) = \sqrt{3}\sin x - \cos x - 2ax + b$ is decreasing on R.

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43. Find the values of a for which the function

$f(x) = (a+2)x^3 - 3ax^2 + 9ax - 1$

decreasing for all real values of x.

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44. If a, b, c are real numbers, then find the intervals in which

$f(x) = \left|x + a^2abacabx + b^2bcacbcx + c^2\right|$ is

increasing or decreasing.

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45. Find the intervals in which $f(x) = (x-1)^3(x-2)^2$ is increasing or decreasing.

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46. Find the intervals in which $f(x) = \frac{4x^2+1}{x}$ is increasing or decreasing.

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47. Determine the intervals in which the function $f(x) = x^4 - 8x^3 + 22x^2 - 24x + 21$ is decreasing or increasing.

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48. Find the intervals for which $f(x) = x^4 - 2x^2$ increasing or decreasing.

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49. Determine the values of x for which $f(x) = \frac{x-2}{x+1} x \neq -1$ is increasing or decreasing

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50. Find the intervals in which $f(x) = \frac{x}{2} + \frac{2}{x}, x \neq 0$ is increasing or decreasing.

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51. For which values of x, the function $f(x) = \frac{x}{x^2 + 1}$ is increasing and for which value of x, it is decreasing.

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52. Find the intervals in which $f(x) = \frac{4x^2 + 1}{x}$ is increasing or decreasing.

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53. Separate the interval $\left[0, \frac{\pi}{2}\right]$ into sub intervals in which function $f(x) = \sin^4(x) + \cos^4(x)$ is strictly increasing or decreasing.

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54. Show that the function f given by $f(x) = \tan^{-1}(\sin x + \cos x), \quad x > 0$ is always an strictly increasing function in $\left(0, \frac{\pi}{4}\right)$

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55. Prove that the function $f(x) = \tan x - 4x$ is strictly decreasing on $(-\pi/3, \pi/3)$.

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56. Solve: $4x^3 - 24x^2 + 44x - 24 > 0$.

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57. Solve:

$$\frac{1}{x+1} - \frac{4}{(2+x)^2} > 0, \quad x \neq -1, \quad -2.$$

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58. Solve: $\dfrac{1-x^2}{5x-6-x^2} < 0$

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59. $Solve \dfrac{8x^2+16x-51}{2x^2+5x-12} > 3$

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60. Solve: $\dfrac{x^2 - 2x + 5}{3x^2 - 2x - 5} > \dfrac{1}{2}$.

Watch Video Solution

61. Solve: $\dfrac{x^2 - 2x + 24}{x^2 - 3x + 4} \leq 4$.

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62. Solve: $\dfrac{x^2 - 4x + 7}{x^2 - 7x + 12} \leq \dfrac{2}{3}$.

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63. Show that the function $f(x) = 2x + 3$ is strictly increasing function on R.

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64. Show that the function $f(x) = x^2$ is strictly increasing function on $(0, \infty)$.

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65. Show that the function $f(x) = a^x, \ a > 1$ is strictly increasing on R.

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66. Show that the function $f(x) = -3x + 12$ is strictly decreasing function on R.

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67. Find the derivative of the function $f(x) = a^x$ with respect to x .

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68. Show that the function $f(x) = x^2$ is a strictly decreasing function on $(-\infty, 0)$.

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69. Show that the function $f(x) = x^2$ is neither strictly increasing nor strictly decreasing on R .

Watch Video Solution

70. Prove that the function $f(x) = (\log)_e x$ is increasing on $(0, \infty)$.

Watch Video Solution

71. Find the second order derivative of the function $f(x) = \log x$ with respect to x .

Watch Video Solution

72. Prove that $f(x) = ax + b$, where $a,\ b$ are constants and $a > 0$ is an increasing function on R .

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73. Prove that $f(x) = ax + b$, where $a,\ b$ are constants and $a < 0$ is a decreasing function on R .

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74. Show that $f(x) = \frac{1}{x}$ is a decreasing function on $(0,\ \infty)$.

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75. Show that $f(x) = \frac{1}{1+x^2}$ decreases in the interval $[0, \infty)$ and increases in the interval $(-\infty, 0]$.

Watch Video Solution

76. Show that $f(x) = \frac{1}{1+x^2}$ is neither increasing nor decreasing on R.

Watch Video Solution

77. Without using the derivative, show that the function $f(x) = |x|$ is (a) strictly increasing in $(0, \infty)$ (b) strictly decreasing in $(-\infty, 0)$

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78. Without using the derivative show that the function $f(x) = 7x - 3$ is strictly increasing function on R.

Watch Video Solution

79. Find the intervals in which $f(x) = -x^2 - 2x + 15$ is increasing or decreasing.

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80. Find the intervals in which the function $f(x) = 2x^3 - 9x^2 + 12x + 15$ is increasing and decreasing.

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81. Find the intervals in which the function $f(x) = 2x^3 + 9x^2 + 12x + 20$ is increasing and decreasing.

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82. Find the intervals in which $f(x) = (x+1)^3(x-1)^3$ is increasing or decreasing.

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83. Find the intervals in which $f(x) = (x-1)^3(x-2)^2$ is increasing or decreasing.

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84. Find the intervals in which the function $f(x) = x^4 - \frac{x^3}{3}$ is increasing or decreasing.

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85. Find the intervals in which the function $f(x) = \log(1+x) - \frac{2x}{2+x}$ is increasing or decreasing.

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86. Find the intervals in which $f(x) = \frac{4x^2+1}{x}$ is increasing or decreasing.

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87. Determine the intervals in which the function $f(x) = x^4 - 8x^3 + 22x^2 - 24x + 21$ is decreasing or increasing.

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88. Find the intervals for which $f(x) = x^4 - 2x^2$ is increasing or decreasing.

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89. Determine the values of x for which $f(x) = \frac{x-2}{x+2}$, $x \neq -1$ is increasing or decreasing.

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90. Find the intervals in which $f(x) = \frac{x}{2} + \frac{2}{x}$, $x \neq 0$ is increasing or decreasing.

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91. Find the intervals in which the function f given by $f(x) = x^3 + \frac{1}{x^3}, x \neq 0$ is (i) increasing (ii) decreasing.

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92. For which values of x, the function $f(x) = \frac{x}{x^2 + 1}$ is increasing and for which values of x, it is decreasing.

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93. Find the intervals in which $f(x) = 2\log(x-2) - x^2 + 4x + 1$ is increasing or decreasing.

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94. Separate $[0, \pi/2]$ into subintervals in which $f(x) = \sin 3x$ is increasing or decreasing.

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95. Find the derivative of the function given by $f(x) = \frac{4\sin x - 2x - x\cos x}{2 + \cos x}$ with respect to x

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96. Separate the interval $[0, \pi/2]$ into sub-intervals in which $f(x) = \sin^4 x + \cos^4 x$ is increasing or decreasing.

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97. Find the intervals in which the function f given by $f(x) = \sin x + \cos x, \quad 0 \leq x \leq 2\pi$ is strictly increasing or strictly decreasing.

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98. Find $f'(x)$ if $f(x) = \sin 3x \cos 3x$

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99. Prove that the function $f(x) = x^3 - 3x^2 + 3x - 100$ is increasing on R.

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100. Let I be an interval disjointed from $[-1, 1]$. Prove that the function $f(x) = x + \frac{1}{x}$ is increasing on I.

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101. Show that the function $f(x) = \frac{3}{x} + 7$ is decreasing for $x \in R - \{0\}$.

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102. Show that the function $x + 1/x$ is increasing for $x > 1$.

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103. Find the second order derivative of function $f(x) = \sin x + \cos x$ with respect to x.

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104. Prove that $f(\theta) = \frac{4\sin\theta}{2+\cos\theta} - \theta$ is an increasing function of θ in $\left[0, \frac{\pi}{2}\right]$.

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105. Prove that the function $f(x) = \tan x - 4x$ is strictly decreasing on $(-\pi/3, \pi/3)$.

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106. Show that $f(x) = 2x + \cot^{-1} x + \log\left(\sqrt{1 + x^2} - x\right)$ is increasing on R .

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107. Test whether the function $f(x) = x^3 - 8$ is increasing on $[1,\ 2]$.

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108. Which of the following functions are decreasing on $(0, \pi/2)$? (i) $\cos x$ (ii) $\cos 2x$ (iii) $\tan x$ (iv) $\cos 3x$

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109. Prove that the function $f(x) = x^2 - x + 1$ is neither increasing nor decreasing on $(-1, 1)$.

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110. On which of the following intervals, the function $x^{100} + \sin x - 1$ is strictly increasing.

$(-1, 1)$ (b) (0,1) $\left(\frac{\pi}{2}, \pi\right)$ (d) $\left(0, \frac{\pi}{2}\right)$

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111. Determine the values of x for which $f(x) = x^x,\ x > 0$ is increasing or decreasing.

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112. Find the intervals in which $f(x) = \frac{x}{\log x}$ is increasing or decreasing

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113. If a, b, c are real numbers, then find the intervals in which $f(x) = \begin{vmatrix} x + a^2 & ab & ac \\ ab & x + b^2 & bc \\ ac & bc & x + c^2 \end{vmatrix}$ is increasing or decreasing.

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114. Show that for $a \geq 1, \quad f(x) = \sqrt{3}\sin x - \cos x - 2ax + b$ is decreasing on R.

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115. Show that $f(x) = \cos(2x + \pi/4)$ is an increasing function on $(3\pi/8, \ 7\pi/8)$.

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116. Find the least value of $'a'$ such that the function $f(x) = x^2 + ax + 1$ is increasing on $[1, 2]$. Also, find the greatest value of $'a'$ for which $f(x)$ is decreasing on $[1, 2]$.

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117. Find the values $'a'$ for which the function

$f(x) = (a+2)x^3 - 3ax^2 + 9ax - 1$

decreases for all real values of x .

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118. Find the values of k for which $f(x) = kx^3 - 9kx^2 + 9x + 3$ is increasing on R.

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119. Find the intervals in which $f(x) = 10 - 6x - 2x^2$ is increasing or decreasing.

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120. Find the intervals in which $f(x) = x^2 + 2x - 5$ is increasing or decreasing.

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121. Find the intervals in which $f(x) = 6 - 9x - x^2$ is increasing or decreasing.

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122. Find the intervals in which $f(x) = 2x^3 - 12x^2 + 18x + 15$ is increasing or decreasing.

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123. Find the intervals in which $f(x) = 5 + 36x + 3x^2 - 2x^3$ is increasing or decreasing.

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124. Find the intervals in which $f(x) = 8 + 36x + 3x^2 - 2x^3$ is increasing or decreasing.

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125. Find the intervals in which $f(x) = 5x^3 - 15x^2 - 120x + 3$ is increasing or decreasing.

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126. Find the intervals in which $f(x) = x^3 - 6x^2 - 36x + 2$ is increasing or decreasing.

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127. Find the intervals in which $f(x) = 2x^3 - 15x^2 + 36x + 1$ is increasing or decreasing.

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128. Find the intervals in which $f(x) = 2x^3 + 9x^2 + 12x + 20$ is increasing or decreasing.

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129. Find the intervals in which $f(x) = 2x^3 - 9x^2 + 12x - 5$ is increasing or decreasing.

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130. Find the intervals in which $f(x) = 6 + 12x + 3x^2 - 2x^3$ is increasing or decreasing.

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131. Find the intervals in which $f(x) = 2x^3 - 24x + 107$ is increasing or decreasing.

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132. Find the intervals in which $f(x) = -2x^3 - 9x^2 - 12x + 1$ is increasing or decreasing.

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133. Find the intervals in which $f(x) = (x-1)(x-2)^2$ is increasing or decreasing.

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134. Find the intervals in which $f(x) = x^3 - 12x^2 + 36x + 17$ is increasing or decreasing.

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135. Find the intervals in which $f(x) = 2x^3 - 24x + 7$ is increasing or decreasing.

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136. Find the derivative of the function $f(x) = \frac{3}{10}x^4$ with respect to x

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137. Find the intervals in which $f(x) = x^4 - 4x$ is increasing or decreasing.

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138. Find the intervals in which $f(x) = \frac{x^4}{4} + \frac{2}{3}x^3 - \frac{5}{2}x^2 - 6x + 7$ is

increasing or decreasing.

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139. Find the intervals in which $f(x) = x^4 - 4x^3 + 4x^2 + 15$ is increasing or decreasing.

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140. Find the intervals in which $f(x) = 5x^{3/2} - 3x^{5/2}, \quad x > 0$ is increasing or

decreasing.

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141. Find the intervals in which $f(x) = x^8 + 6x^2$ is increasing or decreasing.

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142. Find the intervals in which $f(x) = x^3 - 6x^2 + 9x + 15$ is increasing or decreasing.

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143. Find the intervals in which $f(x) = \{x(x-2)\}^2$ is increasing or decreasing.

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144. Find the intervals in which $f(x) = 3x^4 - 4x^3 - 12x^2 + 5$ is increasing or decreasing.

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145. Find the intervals in which $f(x) = \frac{3}{2}x^4 - 4x^3 - 45x^2 + 51$ is increasing or decreasing.

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146. Find the intervals in which $f(x) = \log(2+x) - \frac{2x}{2+x}, \quad x \in R$

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147. Determine the values of x for which the function $f(x) = x^2 - 6x + 9$ is increasing or decreasing. Also, find the coordinates of the point on the curve $y = x^2 - 6x + 9$ where the normal is parallel to the line $y = x + 5$.

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148. Find the intervals in which $f(x) = \sin x - \cos x$, where $0 < x < 2\pi$ is increasing or decreasing.

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149. Show that $f(x) = e^{2x}$ is increasing on R.

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150. Show that $f(x) = e^{1/x}$, $x \neq 0$ is a decreasing function for all $x \neq 0$.

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151. Find the derivative of $\tan(x + y) = x$ with respect to x .

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152. Show that $f(x) = \sin x$ is increasing on $(0, \pi/2)$ and decreasing on $(\pi/2, \pi)$ and neither increasing nor decreasing in $(0, \pi)$.

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153. Show that $f(x) = \log \sin x$ is increasing on $(0, \pi/2)$ and decreasing on $(\pi/2, \pi)$.

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154. Show that $f(x) = x - \sin x$ is increasing for all $x \in R$.

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155. Show that $f(x) = x^3 - 15x^2 + 75x - 50$ is an increasing function for all $x \in R$.

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156. Show that $f(x) = \cos^2 x$ is a decreasing function on $(0, \pi/2)$.

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157. Show that $f(x) = \sin x$ is an increasing function on $(-\pi/2, \pi/2)$.

Watch Video Solution

158. Show that $f(x) = \cos x$ is a decreasing function on $(0, \pi)$, increasing in $(\pi, 0)$ and neither increasing nor decreasing in (π, π).

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159. Show that $f(x) = \tan x$ is an increasing function on $(-\pi/2, \pi/2)$.

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160. Show that $f(x) = \tan^{-1}(\sin x + \cos x)$ is a decreasing function on the interval on $(\pi/4, \pi/2)$.

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161. Show that the function $f(x) = \sin(2x + \pi/4)$ is decreasing on $(3\pi/8,\ 5\pi/8)$.

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162. Show that the function $f(x) = \cot^{-1}(\sin x + \cos x)$ is decreasing on $(0,\ \pi/4)$ and increasing on $(\pi/4,\ \pi/2)$.

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163. Show that $f(x) = (x-1)e^x + 1$ is an increasing function for all $x > 0$.

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164. Show that the function $x^2 - x + 1$ is neither increasing nor decreasing on $(0, 1)$.

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165. Show that $f(x) = x^9 + 4x^7 + 11$ is an increasing function for all $x \in R$.

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166. Prove that the function $f(x) = x^3 - 6x^2 + 12x - 18$ is increasing on R.

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167. State when a function $f(x)$ is said to be increasing on an interval $[a, b]$. Test whether the function $f(x) = x^2 - 6x + 3$ is increasing on the interval $[4, 6]$.

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168. Show that $f(x) = \sin x - \cos x$ is an increasing function on $(-\pi/4, \pi/4)$.

Watch Video Solution

169. Show that $f(x) = \tan^{-1} x - x$ is decreasing function on R.

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170. Determine whether $f(x) = -x/2 + \sin x$ is increasing or decreasing on $(-\pi/3, \pi/3)$.

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171. Find the intervals in which $f(x) = \log(1+x) - \frac{x}{1+x}$ is increasing or decreasing.

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172. Find the intervals in which $f(x) = (x+2)e^{-x}$ is increasing or decreasing.

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173. Show that the function f given by $f(x) = 10^x$ is increasing for all x .

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174. Prove that the function f given by $f(x) = x - [x]$ is increasing in $(0,\ 1)$.

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175. Prove that the function $f(x) = 3x^5 + 40x^3 + 240x$ is increasing on R .

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176. Prove that the function f given by $f(x) = \log \cos x$ is strictly increasing on $(-\pi/2, 0)$ and strictly decreasing on $(0, \pi/2)$.

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177. Show that the function f given by $f(x) = x^3 - 3x^2 + 4x, x \in R$is strictly increasing on R.

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178. Prove that the function $f(x) = \cos x$ is strictly decreasing in $(0, \pi)$

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179. Prove that the function $f(x) = \cos x$ is strictly increasing in $(\pi, 2\pi)$

Watch Video Solution

180. Prove that the function $f(x) = \cos x$ is neither increasing nor decreasing in $(0, 2\pi)$

Watch Video Solution

181. Show that $f(x) = x^2 - x \sin x$ is an increasing function on $(0, \pi/2)$.

Watch Video Solution

182. Find the value(s) of a for which $f(x) = x^3 - ax$ is an increasing function on R .

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183. Find the values of b for which the function $f(x) = \sin x - bx + c$ is a decreasing function on R .

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184. Show that $f(x) = x + \cos x - a$ is an increasing function on R for all values of a .

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185. Find the second order derivative of $\cot x$ with respect to x

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186. Find the intervals in which $f(x) = x|x|, \ x \in R$ is increasing or

decreasing:

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187. Find the intervals in which f(x)=sinx+|sinx| is increasing or decreasing.

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188. Find the derivative of $x^{\sin x}$ with respect to x

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189. What are the values of $'a'$ for which $f(x) = a^x$ is increasing on R

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190. What are the values of $'a'$ for which $f(x) = a^x$ is decreasing on R

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191. Write the set of values of $'a'$ for which $f(x) = (\log)_a x$ is increasing in its domain.

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192. Write the set of values of $'a'$ for which $f(x) = (\log)_a x$ is decreasing in its domain.

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193. Find $'a'$ for which $f(x) = a\,(x + \sin x) + a$ is increasing on R .

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194. Find the values of $'a'$ for which the function $f(x) = \sin x - ax + 4$ is increasing function on R.

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195. Find the set of values of $'b'$ for which $f(x) = b(x + \cos x) + 4$ is decreasing on R.

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196. Find the set of values of $'a'$ for which $f(x) = x + \cos x + ax + b$ is increasing on R.

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197. Write the set of values of k for which $f(x) = kx - \sin x$ is increasing on R.

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198. If $g(x)$ is a decreasing function on R and $f(x) = \tan^{-1}\{g(x)\}$. State whether $f(x)$ is increasing or decreasing on R .

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199. Write the set of values of a for which the function $f(x) = ax + b$ is decreasing for all $x \in R$.

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200. Write the interval in which $f(x) = \sin x + \cos x, \quad x \in [0, \ \pi/2]$ is increasing.

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201. State whether $f(x) = \tan x - x$ is increasing or decreasing its domain.

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202. Write the set of values of a for which $f(x) = \cos x + a^2 x + b$ is strictly increasing on R.

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203. The interval of increase of the function $f(x) = x - e^x + \tan(2\pi/7)$ is (a) $(0, \infty)$ (b) $(-\infty, 0)$ (c) $(1, \infty)$ (d) $(-\infty, 1)$

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204. The function $f(x) = \cot^{-1} x + x$ increases in the interval (a) $(1, \infty)$ (b) $(-1, \infty)$ (c) $(-\infty, \infty)$ (d) $(0, \infty)$

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205. The function $f(x) = x^x$ decreases on the interval (a) $(0, e)$ (b) $(0, 1)$ (c) $(0, 1/e)$ (d) $(1/e, e)$

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206. The function $f(x) = 2\log(x-2) - x^2 + 4x + 1$ increases on the interval (a) $(1,\ 2)$ (b) $(2,\ 3)$ (c) $(1,\ 3)$ (d) $(2,\ 4)$

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207. If the function $f(x) = 2x^2 - kx + 5$ is increasing on $[1,\ 2]$, then k lies in the interval (a) $(-\infty,\ 4)$ (b) $(4,\ \infty)$ (c) $(-\infty,\ 8)$ (d) $(8,\ \infty)$

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208. If $f(x) = x^3 + ax^2 + bx + 5\sin^2 x$ is a strictly increasing function on the set of real numbers then a and b must satisfy the relation:

A. (a) $a^2 - 3b + 15 < 0$

B. (b) $a^2 - 3b + 20 < 0$

C. (c) $a^2 - 3b + 25 < 0$

D. (d) $a^2 - 3b + 30 < 0$

Answer: null

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209. The function $f(x) = (\log)_e\left(x^3 + \sqrt{x^6 + 1}\right)$ is of the following types: (a) even and increasing (b) odd and increasing (c) even and decreasing (d) odd and decreasing

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210. If the function $f(x) = 2\tan x + (2a + 1)(\log)_e|\sec x| + (a - 2)x$

is increasing on R , then (a) $a \in (1/2, \infty)$ (b) $a \in (-1/2, 1/2)$ (c) $a = 1/2$ (d) $a \in R$

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211. Find the derivative of the function $f(x) = \tan^{-1}(g(x))$ with respect to x

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212. Let $f(x) = x^3 - 6x^2 + 15x + 3$. Then, (a) $f(x) > 0$ for all $x \in R$ (b) $f(x) > f(x+1)$ for

all $x \in R$ (c) $f(x)$ is invertible (d) $f(x) < 0$ for all $x \in R$

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213. The function $f(x) = x^2 e^{-x}$ find the derivative with respect to x

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214. Function $f(x) = \cos x - 2\lambda x$ is monotonic decreasing when (a) $\lambda > 1/2$ (b)

$\lambda < 1/2$ (c) $\lambda < 2$ (d) $\lambda > 2$

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215. In the interval $(1, 2)$, function $f(x) = 2|x-1| + 3|x-2|$ is (a) monotonically increasing (b) monotonically decreasing (c) not monotonic (d) constant

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216. Function $f(x) = x^3 - 27x + 5$ is monotonically increasing when (a) $x < -3$ (b) $|x| > 3$ (c) $x \leq -3$ (d) $|x| \geq 3$

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217. Function $f(x) = 2x^3 - 9x^2 + 12x + 29$ is monotonically decreasing when (a) $x < 2$ (b) $x > 2$ (c) $x > 3$ (d) $x \in (1, 2)$

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218. If $f(x) = kx^3 - 9x^2 + 9x + 3$ monotonically increasing in R, then (a) $k < 3$ (b) $k \leq 2$ (c) $k \geq 3$ (d) none of these

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219.

$f(x) = 2x - \tan^{-1} x - \log\left\{x + \sqrt{x^2 + 1}\right\}$ is monotonically increasing when (a) $x > 0$ (b) $x < 0$ (c) $x \in R$ (d) $x \in R - \{0\}$

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220. Function $f(x) = |x| - |x - 1|$ is monotonically increasing when (a) $x < 0$ (b) $x > 1$ (c) $x < 1$ (d) $x \in (0, 1)$

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221. Every invertible function is (a) monotonic function (b) constant function (c) identity function (d) not necessarily monotonic function

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222. In the interval $(1, 2)$, function $f(x) = 2|x-1| + 3|x-2|$ is (a) increasing (b) decreasing (c) constant (d) none of these

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223. If the function $f(x) = \cos|x| - 2ax + b$ increases along the entire number scale, then (a) $a = b$ (b) $a = \frac{1}{2}b$ (c) $a \leq -\frac{1}{2}$ (d) $a \succ \frac{3}{2}$

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224. The function $f(x) = \frac{x}{1+|x|}$ is (a) strictly increasing (b) strictly decreasing (c) neither increasing nor decreasing (d) none of these

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225. The function $f(x) = \frac{\lambda \sin x + 2\cos x}{\sin x + \cos x}$ is increasing, if (a) $\lambda < 1$ (b) $\lambda > 1$ (c) $\lambda < 2$ (d) $\lambda > 2$

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226. Function $f(x) = a^x$ is increasing on R , if

(a) $a > 0$ (b) $a < 0$ (c) a<1 (d) $a > 1$

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227. Function $f(x) = (\log)_a x$ is increasing on R

, if (a) $a < 0$ (b) $a > 1$ (c) $a < 1$ (d) $a > 0$

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228. Let $\varphi(x) = f(x) + f(2a - x)$ and $f(x) > 0$ for all $x \in [0, a]$. Then, $\varphi(x)$ (a)

increases on $[0, a]$ (b) decreases on $[0, a]$ (c) increases on $[-a, 0]$ (d) decreases on $[a, 2a]$

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229. If the function $f(x) = x^2 - kx + 5$ is increasing on $[2, 4]$, then (a) $k \in (2, \infty)$ (b) $k \in (-\infty, 2)$ (c) $k \in (4, \infty)$ (d) $k \in (-\infty, 4)$

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230. The function $f(x) = -x/2 + \sin x$ defined on $[-\pi/3, \pi/3]$ is (a) increasing (b) decreasing (c) constant (d) none of these

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231. If the function $f(x) = x^3 - 9k\,x^2 + 27x + 30$ is increasing on R , then (a) $-1 \leq k < 1$ (b) $k < -1$ or $k > 1$ (c) `0

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232. The function $f(x) = x^9 + 3x^7 + 64$ is increasing on (a) R (b) $(-\infty, 0)$ (c) $(0, \infty)$ (d) R_0

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