



MATHS

BOOKS - ARIHANT MATHS

GRAPHICAL TRANSFORMATIONS

Exercise

1. Plot $y = |x|$ and $y = |x| + 2$.



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2. Plot $y = |x|$ and $y = |x| - 2$.

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3. Plot $y = e^x$, $y = e^x + 1$ and $y = e^x - 1$.

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4. Plot $y = |x|$ and $y = |x - 2|$

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5. Plot $y = |x|$ and $y = |x + 2|$

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6. Plot $y = \sin\left(x + \frac{\pi}{4}\right)$ and $y = \sin\left(x - \frac{\pi}{4}\right)$.

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7. Plot $y = \sin x$ and $y = 2 \sin x$.

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8. Plot $y = \sin x$ and $y = \frac{1}{2} \sin x$.

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9. Plot $y = \sin x$ and $y = \sin 2x$.

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10. Plot $y = \sin x$ and $y = \frac{1}{2}\sin x$.

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11. Draw the graph of $y = e^{-x}$, when the graph of $y = e^x$ is known.

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12. Draw graph of $y = \log(-x)$, when the graph of $y = \log(x)$ is given.

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13. Draw the graph of $y = -e^x$ when the graph of $y = e^x$ is known.

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14. Draw the graph of $y = -\log(x)$ when the graph of $y = \log x$ is known.

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15. Draw the graph of $y = |\log x|$ when the graph of $y = \log(x)$ is known.

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16. Draw the graph of $y = \log|x|$ when the graph of $y = \log(x)$ is known.

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17. Draw the graph of $y = \left| |x|^2 - 2|x| - 3 \right|$, if $y = x^2 - 2x - 3$

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18. Draw graph for $y = |x - 1|$.

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19. Draw the graph for $|y| = (x - 1)(x - 2)$.



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20. Draw the graph of $y = [x^3]$,

when $-2^{1/3} \leq x \leq 2^{1/3}$



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21. Draw the graph of $y = [\sin x]$.



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22. Draw the curve $y = e^x$

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23. Draw the graph for $y = (\{x\} - 1)^2$.

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24. Plot $y = x + \sin x$.

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25. Plot $y = |x| - 2$ and hence $f(x) = \frac{1}{|x| - 2}$

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26. If $f(x) = \begin{cases} |x - 1|([x] - x), & x \neq 1 \\ 0, & x = 1 \end{cases}$, then

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27. Draw graph for $y = \max \{2x, x^2\}$ and discuss the continuity and differentiability.

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28. Draw the graph of $y = 2 - |x - 1|$.

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29. Evaluate $\int (\sin x + x) dx$

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30. The number of real solution of the equation $e^x + x = 0$, is

A. 0

B. 1

C. 2

D. None of these

Answer:

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31. The number of real solutions of the equation

$$\log_a x = |x|, 0 < a < 1, \text{ is}$$

A. A. 0

B. B. 1

C. C. 2

D. D. None of these

Answer:



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32. number of solution of the equation $|x| = \cos x$

A. 0

B. 1

C. 2

D. 3

Answer:



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33. Solve the following equation :- $x^2 + 3 = 0$

A. 1

B. 2

C. 3

D. 4

Answer:



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34. The number of real solution of the equation

$$x^2 = 1 - |x - 5| \text{ is:}$$

A. (a) 1

B. (b) 2

C. (c) 4

D. (d) None of these

Answer:



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35. Number of solutions $2^{\sin(|x|)} = 4^{|\cos x|} \in [-\pi, \pi]$ is equal to

A. 2

B. 4

C. 6

D. 8

Answer:



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36. Number of roots of $|\sin|x|| = x + |x|$ in $[-2\pi, 2\pi]$, is

A. 2

B. 3

C. 4

D. 6

Answer:



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37. The equation $3^{x-1} + 5^{x-1} = 34$ has

A. (a)one solution

B. (b)two solutions

C. (c)three solutions

D. (d)four solutions

Answer:



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38. Number of solutions of the equation $\cos[x] = e^{2x-1}$, $x \in [0, 2\pi]$, where $[.]$ denotes the greatest integer function is

A. 1

B. 2

C. 3

D. 4

Answer:

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39. Let $g(x) = \sqrt{x - 2k}$, $\forall 2k \leq x < 2(k + 1)$, where

$k \in$ integer. Check whether $g(x)$ is periodic or not.

A. $g(x) = \sqrt{x + 2}$, $-2 \leq x < 0$

B. $g(x) = \sqrt{x - 2}$, $2 \leq x < 4$

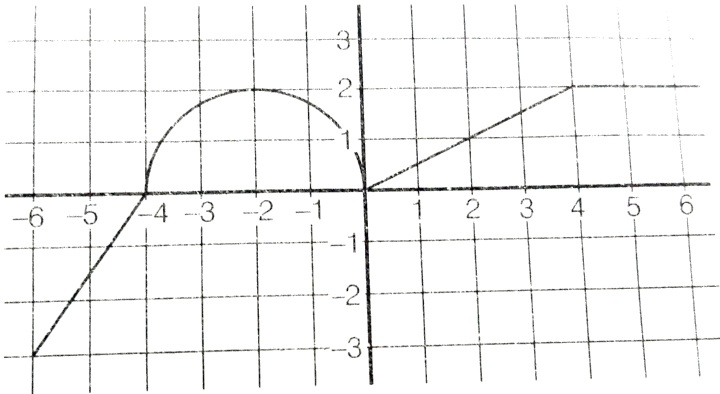
C. $g(x) = \sqrt{x}$, $0 \leq x < 2$

D. period of $g(x)$ is 2.

Answer:

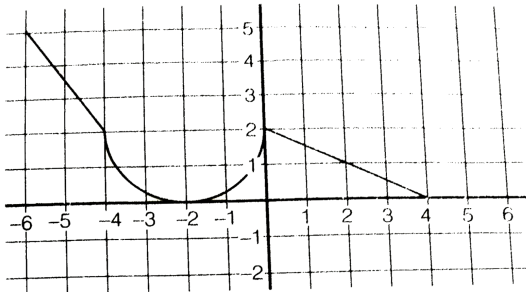
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40. The graph of $f(x)$ is given below.

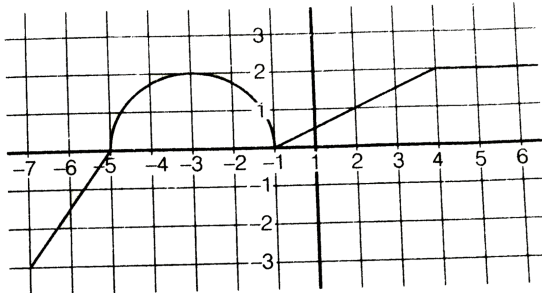


Then, (a) Graph of $-f(x) + 2$ is

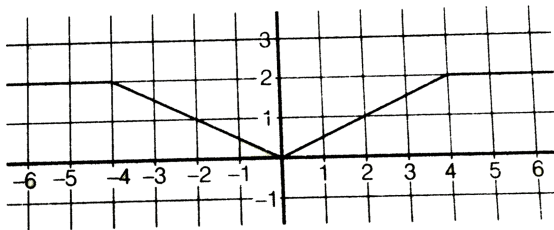
Then, (a) Graph of $-f(x) + 2$ is



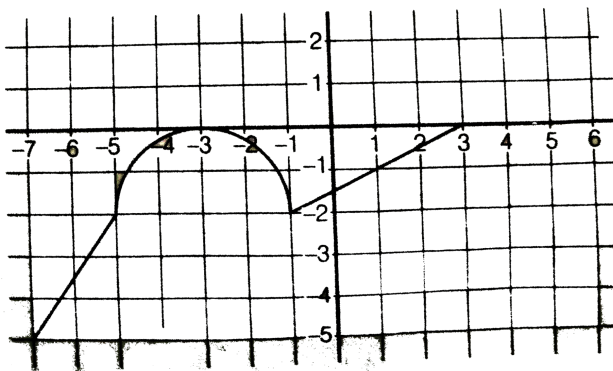
(b) Graph of $-f(x-1)$ is



(c) Graph of $f(|x|)$ is



(d) Graph of $f(x+1) - 2$ is



A. Then, (a) Graph of $-f(x) + 2$ is



B. Graph of $-f(x - 1)$ is



C. Graph of $f(|x|)$ is



D. Graph of $f(x + 1) - 2$ is



Answer:



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41. Number of solutions of the equation, $[y + [y]] = 2 \cos x$ is: (where $y = 1/3)[\sin x + [\sin x + [\sin x]]]$ and $[\] =$ greatest integer function) 0 (b) 1 (c) 2 (d) ∞

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42. The sum of roots of the equation $\cos^{-1}(\cos x) = [x]$, $[.]$ denotes the greatest integer function, is $2\pi + 3$ (b) $\pi + 3$ (c) $\pi - 3$ (d) $2\pi - 3$

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43. Sketch the graph of $y = \log_{0.5}|x|$.

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44. Sketch the graph of $y = \left| \left| \frac{1}{x} \right| - 3 \right|$.

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45. Find the number of solutions of the equations $y = |\sin x|$ and $x^2 + y^2 = 1$.

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46. Find the number of solutions of $4\{x\} = x + [x]$.

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47. Sketch the graph of $\left| \sin x + \frac{1}{2} \right|$.

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48. Sketch the graph of $y = \frac{2^x}{2^{|x|}}$.

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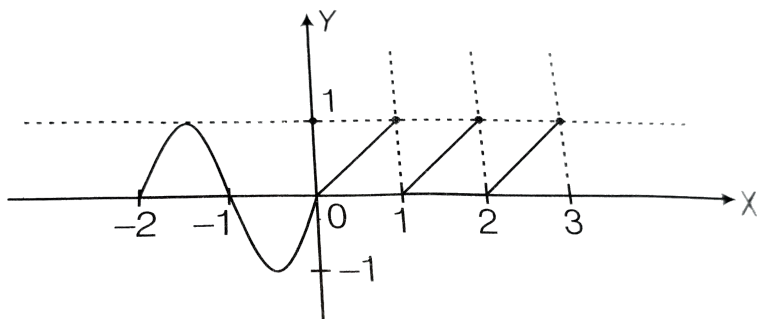
49. Sketch the region for $y = \sin(x - [x])$.

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50. Sketch the region for $|y| = \sin x$.

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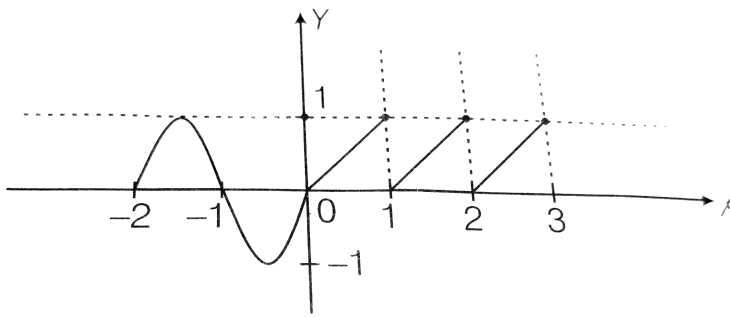
51. Consider the following function f whose graph is given below.



Draw the graph of following functions.

(a) $f(x) + 1$

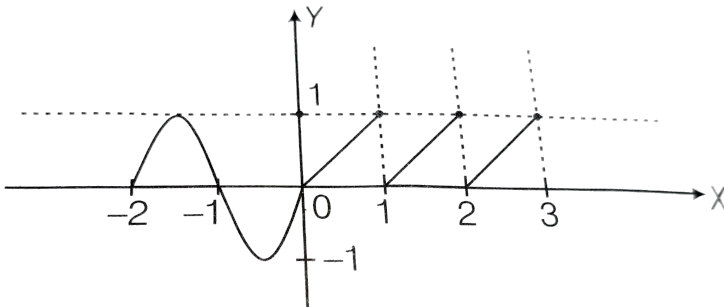
52. Consider the following function f whose graph is given below.



Draw the graph of $f(-x)$

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53. Consider the following function f whose graph is given below.



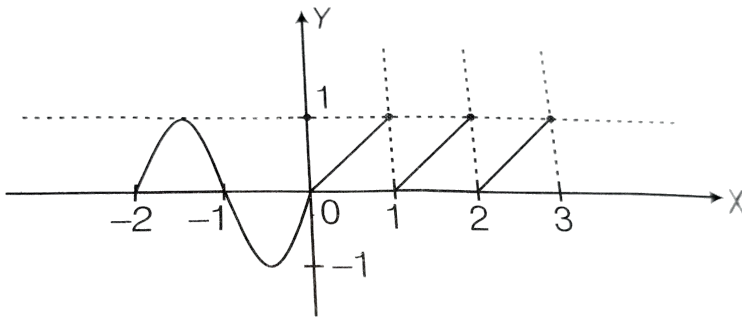
Draw the graph of following functions.

(c) $-f(x)$



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54. Consider the following function f whose graph is given below.

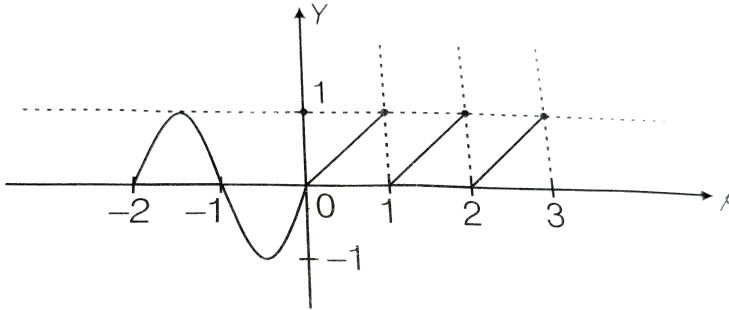


Draw the graph of $[f(x)]$



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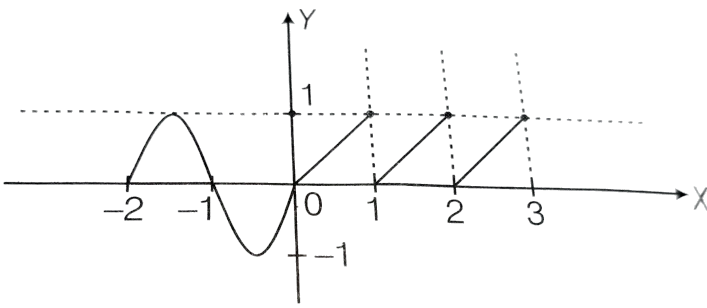
55. Consider the following function f whose graph is given below.



Draw the graph of $f(-x)$

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56. Consider the following function f whose graph is given below.

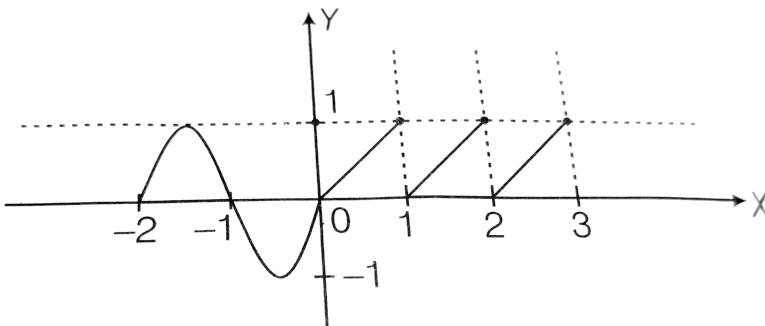


Draw the graph of following functions.

(f) $f(|x|)$

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57. Consider the following function f whose graph is given below.

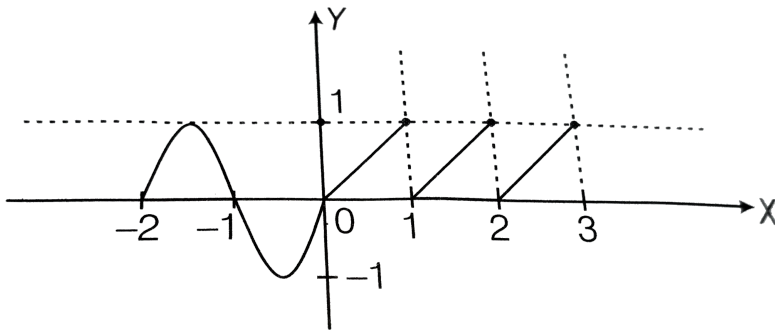


Draw the graph of following functions.

(g) $2f(x)$

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58. Consider the following function f whose graph is given below.

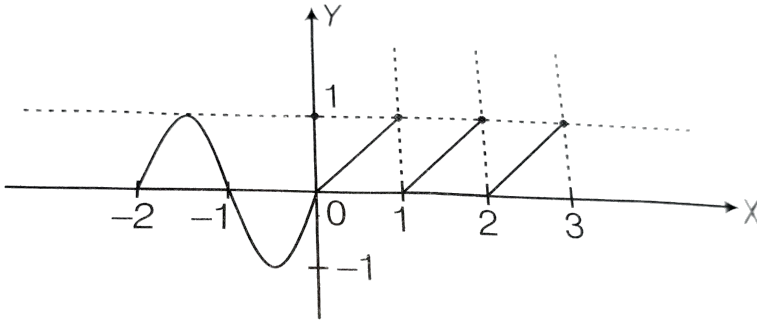


Draw the graph of following functions.

$f(2x)$

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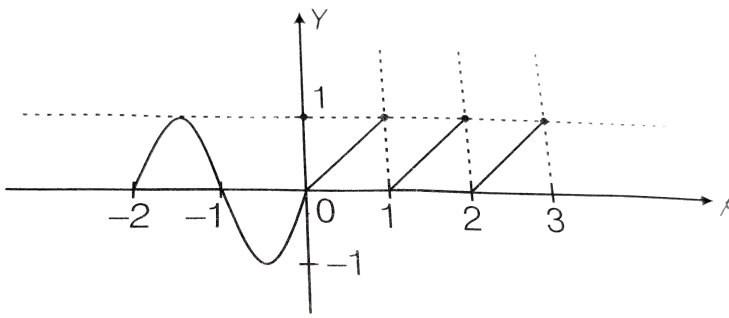
59. Consider the following function f whose graph is given below.



Draw the graph of $|f(x)|$

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60. Consider the following function f whose graph is given below.



Draw the graph of $f(-x)$

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61. Sketch the graph of
 $y = \max(\sin x, \cos x), \forall x \in \left(-\pi, \frac{3\pi}{2}\right)$.

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62. Sketch the graph for $y = \min\{\tan x, \cot x\}$.

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63. Sketch the graph of $y = \min \{|x|, |x - 1|, |x + 1|\}$.

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64. Sketch the graph of $y = \sin^{-1} x, \forall x \in [-1, 1]$.

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65. Sketch the graph for $y = \cos^{-1} x, \forall x \in [-1, 1]$.

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66. Sketch the graph for $y = \tan^{-1} x, \forall x \in \mathbb{R}$.



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67. Sketch the graph for $y = \sin^{-1}(\sin x)$.



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68. Sketch the graph for $y = \cos^{-1}(\cos x)$.



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69. Draw the graph of $y = \tan^{-1}(\tan x)$



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70. Find the value of x graphically which satisfy

$$\left| \frac{x^2}{x-1} \right| \leq 1.$$

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71. Find $\frac{dy}{dx}$ if $x = e^y$

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72. Find the values of x graphically which satisfy,

$-1 \leq [x] - x^2 + 4 \leq 2$, where $[.]$ denotes the greatest integer function.





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73. Find the number of solutions of $2 \cos x = |\sin x|$ when $x \in [0, 4\pi]$.



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74. Sketch the curves

$$y = \sqrt{x - [x]}$$

(where $[.]$ denotes the greatest integer function).



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75. Sketch the curves

$$(iii) y = \left| [x] + \sqrt{x - [x]} \right|$$

(where $[.]$ denotes the greatest integer function).



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76. Sketch the curves

$$(iii) y = \left| [x] + \sqrt{x - [x]} \right|$$

(where $[.]$ denotes the greatest integer function).



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Exercise For Session 1

1. Plot the following functions.

$$y = x^2 + 1$$



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2. Plot the following functions.

$$y = x^2 - 1$$



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3. Plot the following functions.

$$y = x^3 + 1$$



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4. Plot the following functions.

$$y = x^3 - 1$$



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5. Plot the following functions.

$$y = \sin x + 1$$



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6. Plot the following functions.

$$y = \sin x - 1$$



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7. Plot the following functions.

$$y = (\log_e x) + 1$$



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8. Plot the following functions.

$$y = (\log_e x) - 1$$



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Exercise For Session 2

1. Solve the following linear equations: $z + 8 = 9$



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2. Draw the graph of the following function.

$$f(x + 1)$$



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3. $A\{1, 2, 3, 4\}$ and $B\{5, 6, 7, 8\}$ then find the $A - B$



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4. Draw the graph of the following function.

$$-f(x)$$



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5. Draw the graph of the following function.

$$f(-x)$$



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6. Draw the graph of the following function.

$$2f(x)$$



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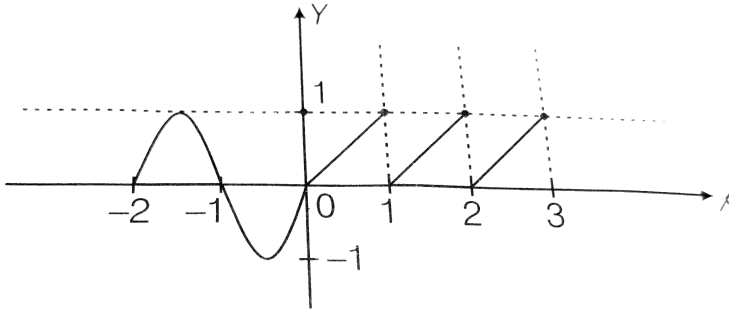
7. Draw the graph of the following function.

$$2f(x)$$



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8. Consider the following function f whose graph is given below.



Draw the graph of $f(-x)$

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9. Draw the graph of the following function.

$$2f(x)$$

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Exercise For Session 3

1. Solve the following linear equations: $11x = 121$



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2. Plot the following.

$$y = |x^2 - 2x - 3|$$



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3. Plot the following.

$$y = x^2 - 2|x| - 3$$



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4. Plot the following.

$$y = |\log_2 x|$$

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5. Plot the following.

$$y = |\log_2 |x||$$

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6. Plot the following.

$$y = \log_2 |1 - x|$$

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7. Plot the following functions.

$$y = (\log_e x) - 1$$



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8. Plot the following functions.

$$y = x^2 + 1$$



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9. Plot the following functions.

$$y = x^2 + 1$$



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10. Plot the following functions.

$$y = x^2 + 1$$



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11. Plot the following functions.

$$y = x^2 + 1$$



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12. Plot the following functions.

$$y = (\log_e x) - 1$$



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13. Draw graph of $y = \log(-x)$, when the graph of $y = \log(x)$ is given.

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14. Find the number of solutions of $\sin \pi x = |\log_2(-x)|$

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15. Find the number of solutions of

$$2^{|x|} = \sin x^2$$

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16. Find the number of solutions of the equation

$$\sin x = x^2 + x + 1.$$



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Exercise For Session 4

1. Plot the following, where $[.]$ denotes integer function.

$$f(x) = [x^2], \quad \text{where } -2 \leq x \leq 2$$



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2. Plot the following, where $[.]$ denotes integer function.

$$f(x) = [|x|]$$



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3. Plot the following, where $[.]$ denotes integer function.

$$f(x) = [|x - 2|].$$



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4. Plot the following, where $[.]$ denotes integer function.

$$f(x) = [|x| - 2]$$



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5. Plot the following. $f(x) = \sin^{-1}(\sin|x|)$



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6. Plot the following, where $[.]$ denotes greatest integer function.

$$f(x) = [\cos^{-1} x]$$



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7. Plot the following, where $[.]$ denotes integer function.

$$f(x) = \cos(x - [x])$$



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8. Plot the following, where $[.]$ denotes integer function.

$$f(x) = [\sin^{-1}(\sin x)]$$



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9. Plot the graph for

$$f(x) = \min(x - [x], -x - [-x]).$$



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10. Find $\frac{dy}{dx}$, if $4x + 9y = \sin y$



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11. Find the area enclosed by the curves

$$\max(2|x|, 2|y|) = 1$$



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12. Find the area enclosed by the curves

$$\max (|x + y|, |x - y|) = 1$$



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Exercise Single Option Correct Type Questions

1. The number of real solutions of the equation

$$e^{|x|} - |x| = 0, \text{ is}$$

A. 0

B. 1

C. 2

D. None of these

Answer: a



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2. The number of real solutions of the equation

$$3^{-|x|} - 2^{|x|} = 0 \text{ is:}$$

A. (a) 0

B. (b) 1

C. (c) 2

D. (d) 3

Answer: c



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3. The number of solutions of $3^{|x|} = |2 - |x||$, is

A. 0

B. 2

C. 4

D. infinite

A. 0

B. 2

C. 4

D. infinite

Answer: B



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4. What is $|-26|$?

A. (a) -26

B. (b) 26

C. (c) 2

D. (d) 1

Answer: C



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5. The equation $e^x = m(m + 1)$, $m < 0$ has

- A. no real root
- B. exactly one real root
- C. two real root
- D. None of the above

Answer: B



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6. The number of real solutions of the equation

$$1 - x = [\cos x] \text{ is}$$

A. 1

B. 2

C. 3

D. 4

Answer: B



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7. The number of roots of the equation $1 + 3^{\frac{x}{2}} = 2^x$ is

A. 0

B. 1

C. 2

D. None of the above

Answer: B



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Exercise More Than One Correct Option Type Questions

1. The equation $x^2 - 2 = [\sin x]$, where $[\cdot]$ denotes the greatest integer function, has

- A. infinity many roots
- B. exactly one integer root
- C. exactly one irrational root
- D. exactly two roots

Answer: B::C::D



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2. Consider the function $f(x) = \begin{cases} x - [x] - \frac{1}{2} & x \notin I \\ 0 & x \in I \end{cases}$

where $[.]$ denotes the fractional integral function and I is the set of integers. Then find

$g(x) = \max \{x^2, f(x), |x|\}$, $-2 \leq x \leq 2$.

A. x^2 , $-2 \leq x \leq -1$

B. $1 - x$, $-1 < x \leq -\frac{1}{4}$

C. $\frac{1}{2} + x$, $-\frac{1}{4} < x < 0$

D. $1 + x$, $0 \leq x < 1$

Answer: A::B::C::D



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3. Let $f(x)$ be defined on $[-2, 2]$ and be given by

$$f(x) = \begin{cases} -1, & -2 \leq x \leq 0 \\ x - 1, & 1 < x \leq 2 \end{cases} \text{ and } g(x) = f(|x|) + |f(x)|$$

.

Then find $g(x)$.

A. $-x, -2 \leq x \leq 0$

B. $x, -2 \leq x \leq 0$

C. $0, 0 < x \leq 1$

D. $2(x - 1), 1 < x \leq 2$

Answer: A::C::D



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1. Statement I The graph of $y = \sec^2 x$ is symmetrical about the Y-axis.

Statement II The graph of $y = \tan x$ is symmetrical about the origin.

A. Both Statement I and Statement II are correct and

Statement II is the correct explanation of Statement

I

B. Both Statement I and Statement II are correct but

Statement II is not the correct explanation of

Statement I

C. Statement I is correct but Statement II is incorrect

D. Statement II is correct but Statement I is incorrect

Answer: A



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2. Statement I The equation $|(x - 2) + a| = 4$ can have four distinct real solutions for x if a belongs to the interval $(-\infty, 4)$.

Statement II The number of point of intersection of the curve represent the solution of the equation.

- (a) Both Statement I and Statement II are correct and Statement II is the correct explanation of Statement I
- (b) Both Statement I and Statement II are correct but Statement II is not the correct explanation of Statement I
- (c) Statement I is correct but Statement II is incorrect
- (d) Statement II is correct but Statement I is incorrect

- A. Both Statement I and Statement II are correct and Statement II is the correct explanation of Statement I
- B. Both Statement I and Statement II are correct but Statement II is not the correct explanation of Statement I
- C. Statement I is correct but Statement II is incorrect
- D. Statement II is correct but Statement I is incorrect

Answer: D

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1. Find the differentiate of $\cos x + 2x$ with respect to x

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2. Find the differentiate of $\tan x + 2x$ with respect to x

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3. $f(x) = \begin{cases} x - 1, & -1 \leq x \leq 0 \\ x^2, & 0 \leq x \leq 1 \end{cases}$ and $g(x) = \sin x$

Consider the functions

$$h_1(x) = f(|g(x)|) \text{ and } h_2(x) = |f(g(x))|.$$

Which of the following is not true about $h_1(x)$?

A. It is a periodic function with period π

B. The range is $[0, 1]$

C. Domain \mathbb{R}

D. None of these

Answer: D



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4. Find the differentiate of $\cos^2 x + \sin^2 x$ with respect to x .



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Matching Type Questions

1. Write the proper subsets of $\{1, 3, 5\}$



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Exercise Subjective Type Questions

1. Let $f(x) = x + 2|x + 1| + x - 1|$. If $f(x) = k$ has exactly one real solution, then the value of k is (a) 3 (b) 0 (c) 1 (d) 2



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2. The number of roots of the equation $x \sin x = 1$, $x \in [-2\pi, 0) \cup (0, 2\pi]$ is (a) 2 (b) 3 (c) 4 (d)

0



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3. The number of solutions of $\tan x - mx = 0, m > 1$, in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ is (a) 1 (b) 2 (c) 3 (d) m



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Exercise Questions Asked In Previous 13 Years Exam

1. Find the number of solutions of the equation

$$\frac{x^2}{1 - |x - 2|} = 1, \text{ graphically.}$$



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2. Find the number of solutions for $\sin x \tan 4x = \cos x$,
when $x \in (0, \pi)$

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3. Find number of solutions for equation
 $[\sin^{-1} x] = x - [x]$, where $[.]$ denotes the greatest
integer function.

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4. If x and y satisfy the equations
 $\max(|x + y|, |x - y|) = 1$ and $|y| = x - [x]$, the

number of ordered pairs (x, y) .



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5. Find the area enclosed by

$$|x + y - 1| + |2x + y + 1| = 1.$$



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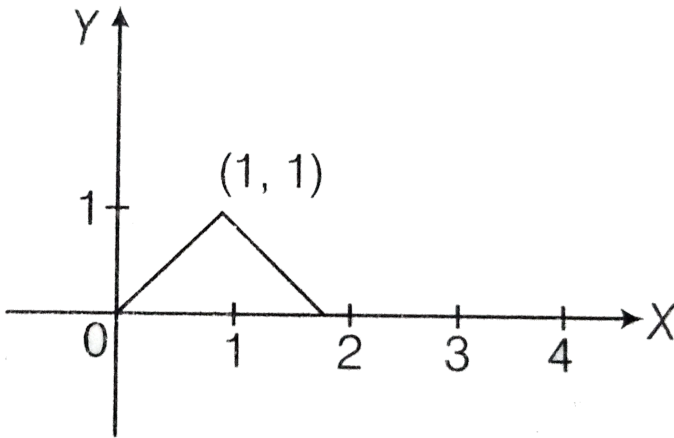
6. Find $f(x)$ when it is given by

$$f(x) = \max \left\{ x^3, x^2, \frac{1}{64} \right\}, \forall x \in [0, \infty).$$



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7. Find a formula for the function f graphed as



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8. Find $\frac{dy}{dx}$ if $2y = \cos y - 2x$

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9. Find the differentiate of $2x \tan x$ with respect to x

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10. Find the differentiate of $2x \sin x$ with respect to x

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