MATHS

BOOKS - ARIHANT MATHS (ENGLISH)

GRAPHICAL TRANSFORMATIONS

Exercise

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

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

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

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

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

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

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

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

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

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

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

is known.

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

$y = \log(x)$ is given.

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

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

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

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

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

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

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

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

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

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

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 $f(x) = \dfrac{1}{|x| - 2}$

26. Let $f(x) = \begin{cases} x \sin. \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ and

$g(x) = \begin{cases} x^2 \sin. \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

Discuss the graph for f(x) and g(x), and evaluate the continuity and differentiabilityof f(x) and g(x).

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

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

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29. Let $h(x) = \min\{x, x^2\}$, for every real number of X. Then (A) h is continuous for all x (B) h is differentiable for all x (C) $h'(x) = 1$, for all x > 1 (D) h is not differentiable at two values of x

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:

31. The number of real solutions of the equation $\log_a x = |x|, 0 < a < 1$, is

A. A. 0

B. B. 1

C. C. 2

D. D. None of these

Answer:

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

A. 0

B. 1

C. 2

D. 3

Answer:

33. How many roots does the following equation possess

$$3^{|x|}(|2 - |x| \ | \ ) = 1?$$

A. 1

B. 2

C. 3

D. 4

Answer:

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34. The number of real solution of the equation

$x^2 = 1 - |x - 5|$ is:

A. (a) 1

B. (b) 2

C. (c) 4

D. (d) None of these

Answer:

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

equal to

A. 2

B. 4

C. 6

D. 8

Answer:

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

A. 2

B. 3

C. 4

D. 6

Answer:

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:

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 $g(x) = \sqrt{x - 2k}, \forall 2k \le x < 2(k + 1),$ where

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

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

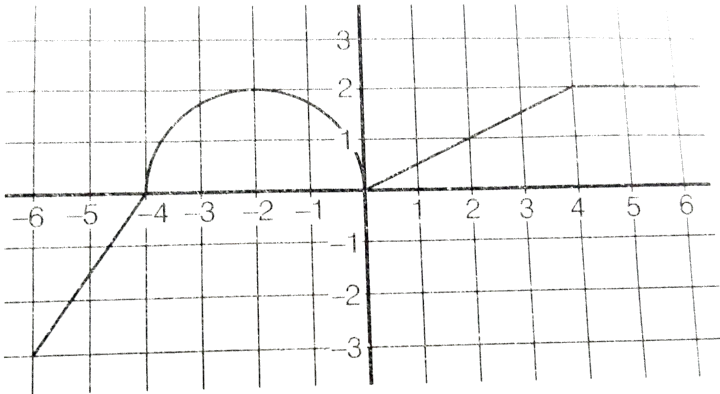B. $g(x) = \sqrt{x - 2}, 2 \le x < 4$

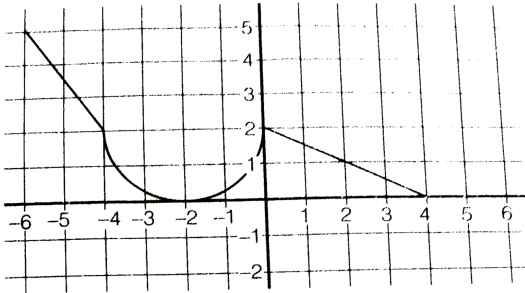C. $g(x) = \sqrt{x}, 0 \le x < 2$

D. period of g(x) is 2.

Answer:

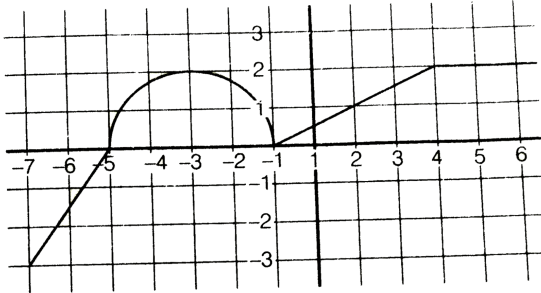▶ **Watch Video Solution**

40. The graph of f(x) is given below.
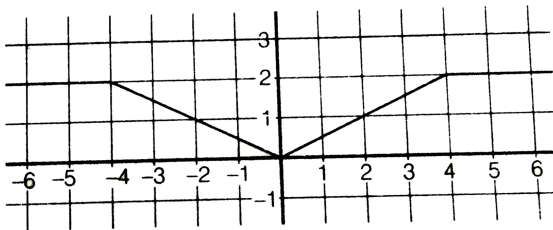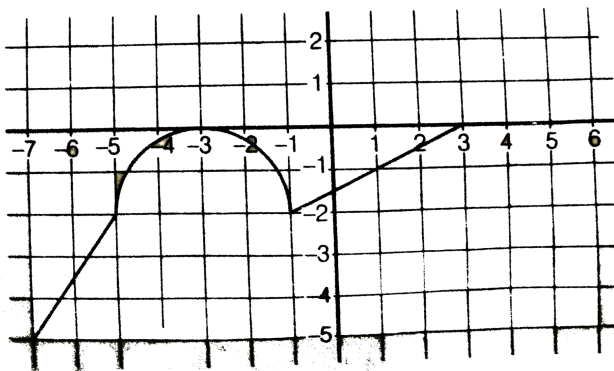
Then, (a) Graph of $-f(x) + 2$ is

(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) ∞

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) $2\pi - 3$

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

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

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

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

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

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

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

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

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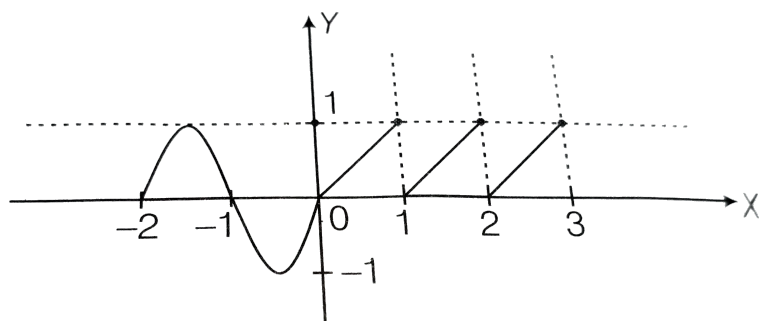
Draw the graph of following functions.

(a) $f(x) + 1$

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

Draw the graph of following functions.

$f(x) - 1$

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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 $[f(x)]$

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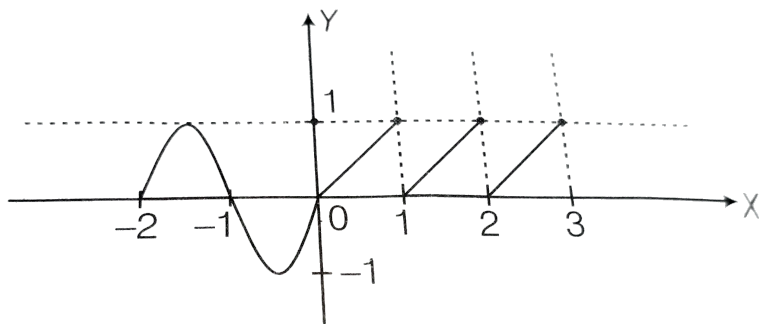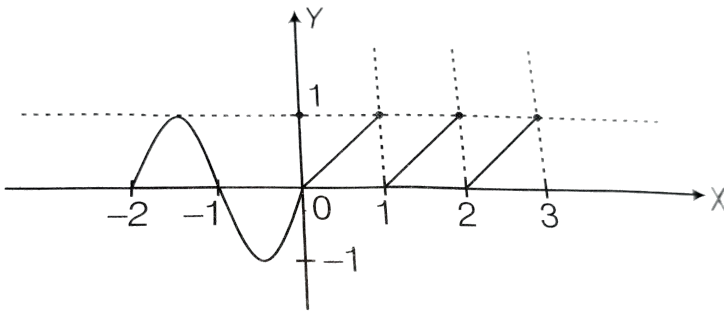

Draw the graph of $f(-x)$

56. Consider the following function f whose graph is given

below.

Draw the graph of following functions.

(f) $f(|x|)$

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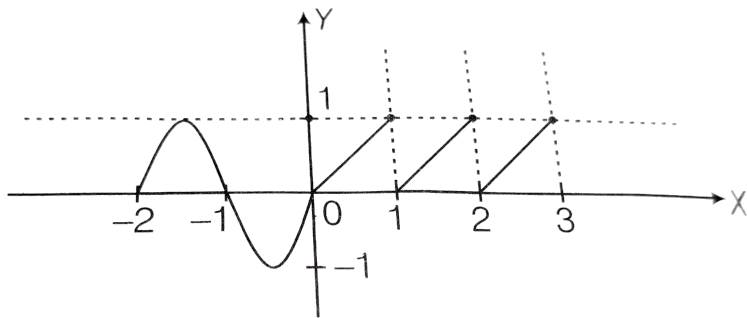
below.

Draw the graph of following functions.
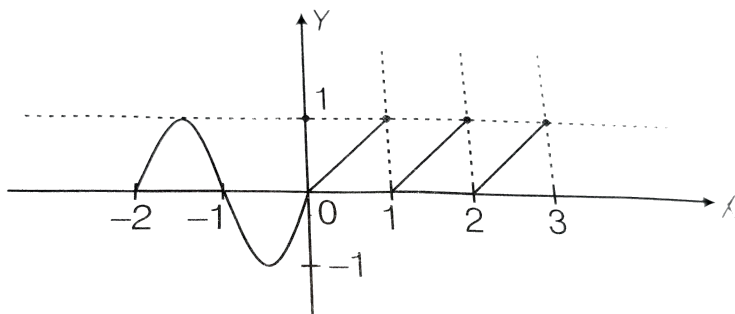
(g) $2f(x)$

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

Draw the graph of following functions.

$f(2x)$
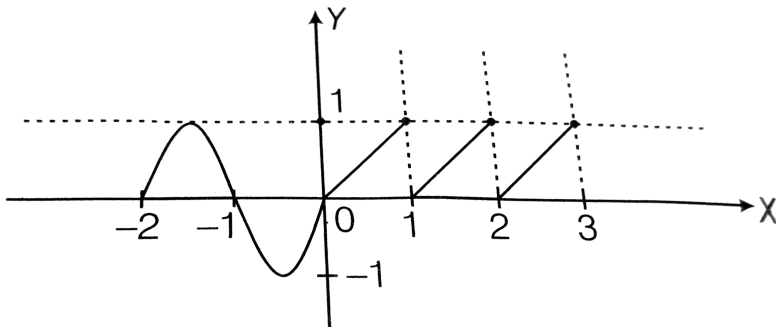
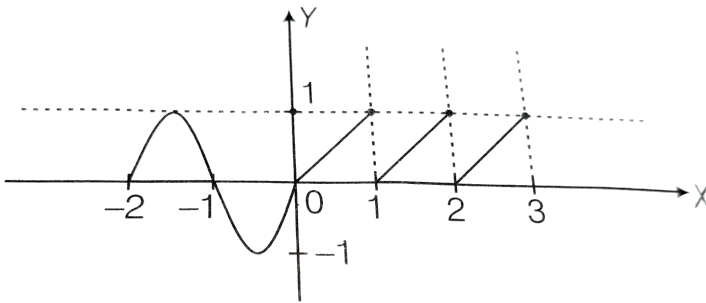**59.** Consider the following function f whose graph is given
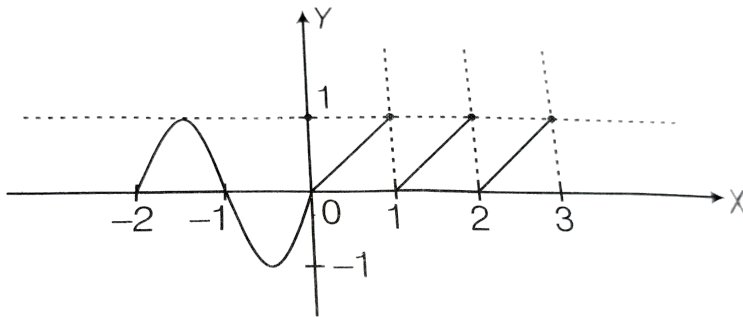
below.

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

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

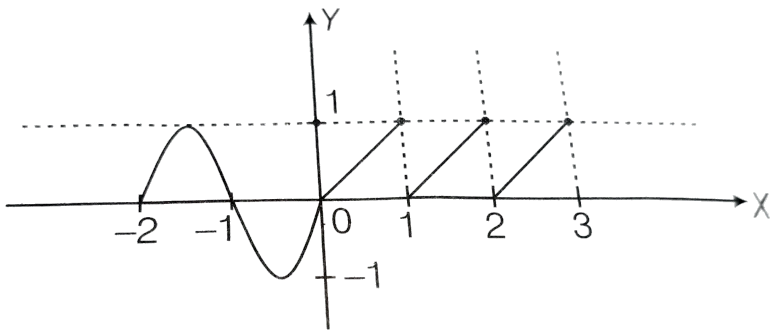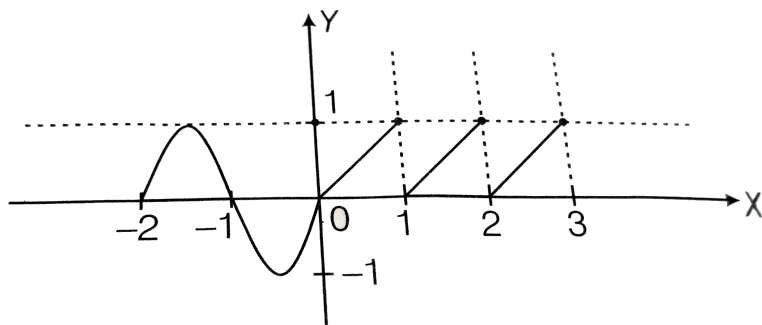Draw the graph of following functions.

(g) $f(x - [x])$

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

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

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

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

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

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

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

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

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

70. Find the value of x graphically which satisfy $\left| \dfrac{x^2}{x-1} \right| \leq 1.$

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

72. Find the values of x graphically which satisfy, $-1 \le [x] - x^2 + 4 \le 2$, where $[.]$ denotes the greatest integer function.

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

74. Sketch the curves

(i)$y = \sqrt{x - [x]}$

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

75. Sketch the curves

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

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

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

76. Sketch the curves

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

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

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

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

2. Draw the graph of the following function.

$f(x + 1)$

3. Draw the graph of the following function.

$f(x + 1)$

4. Draw the graph of the following function.

$-f(x)$

5. Draw the graph of the following function.

$f(-x)$

6. Draw the graph of the following function.

$2f(x)$

7. Draw the graph of the following function.

$\frac{1}{2}f(x)$

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

Draw the graph of following functions.

$f(2x)$
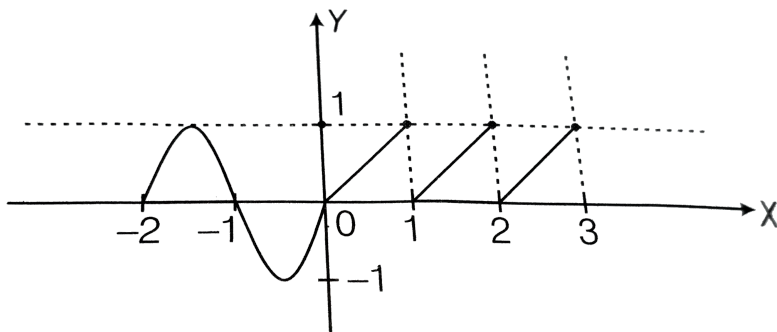
9. Draw the graph of the following function.

$\dfrac{1}{2}f(x)$

Exercise For Session 3

1. Consider the following function f, whose graph is given below.

Draw the graph of the following functions.

(i) $|f(x)|$

(ii) $f(|x|)$

(iii) $|f(|x|) - 1|$

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2. Plot the following.

$$y = \left| x^2 - 2x - 3 \right|$$

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3. Plot the following.

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

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4. Plot the following.

$$y = \left| \log_2 x \right|$$

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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.

$$y = \log_2 (2 - x)^2$$

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8. Plot the following.

$$y = |\cos|x \,|\,|$$

9. Plot the following.

$$y = \left|2 - 2^2\right|$$

10. Plot the following.

$$y = \sin(|x|)$$

11. Plot the following.

$$y = |\cos|x|\ |$$

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12. Plot the following.

$$|f(x)| = \log_e x$$

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13. Plot the graph, $|f(x)| = \log_2(-x)$

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

15. Find the number of solutions of

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

16. Find the number of solutions of the equation

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

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

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

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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.

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

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

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

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

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

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

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.

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

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9. Plot the graph for

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

10. Find the area enclosed by the curves

$$\max \left(|x|, |y| \right) = 1$$

11. Find the area enclosed by the curves

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

12. Find the area enclosed by the curves

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

Exercise Single Option Correct Type Questions

1. The number of real solutions of the equation $e^{|x|} - |x| = 0$, is

A. o

B. 1

c. 2

D. None of these.

A. 0

B. 1

C. 2

D. None of these

Answer: a

2. The number of real solutions of the equation $3^{-|x|} - 2^{|x|} = 0$ is:

A. (a) 0

B. (b) 1

C. (c) 2

D. (d) 3

Answer: c

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

A. 0

B. 2

C. 4

D. infinite

Answer: B

4. The total number of roots of the equation

$$\left|x - x^2 - 1\right| = \left|2x - 3 - x^2\right| \text{ is}$$

A. o

B. 1

C. 2

D. infinity many

A. 0

B. 1

C. 2

D. infinity many

Answer: C

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

6. The number of real solutions of the equation

$1 - x = [\cos x]$ 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. Noe of the above

Answer: B

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

A. infinity many roots

B. exactly one integer root

C. exactly one irrational root

D. exactly two roots

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

where [.] denotes the fractional integral function and I is

the set of integers. Then find

$g(x)$ max . $[x^2, f(x), |x|\}, \ -2 \le x \le 2$.

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

B. $1 - x, \ -1 < x \le -\dfrac{1}{4}$

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

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

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

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

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

.

Then find $g(x)$.

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

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

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

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

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 $y = tax$ 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 $(-\infty, 4)$.

Statemment 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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Exercise Passage Based Questions

1. Let $f(x) = f_1(x) - 2f_2(x)$, where

where $f(x) = \begin{cases} \min\left\{x^2, |x|\right\}, & |x| \le 1 \\ \max\left\{x^2, |x|\right\}, & |x| > 1 \end{cases}$

and $f_2(x) = \begin{cases} \min\left\{x^2, |x|\right\}, & |x| > 1 \\ \max\left\{x^2, |x|\right\}, & |x| \le 1 \end{cases}$

and   let

$$g(x) = \begin{cases} \min\ \{f(t): -3 \le t \le x, & -3 \le x < 0\} \\ \max\ \{f(t): 0 \le t \le x, & 0 \le x \le 3\} \end{cases}$$

For $-3 \le x \le -1$, the range of g(x) is

A. $x^2 - 2x + 1$

B. $x^2 + 2x - 1$

C. $x^2 + 2x + 1$

D. $x^2 - 2x - 1$

Answer: b

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2. Let $f(x) = f_1(x) - 2f_2(x)$, where

where $f(x) = \begin{cases} \min\ \{x^2, |x|\}, & |x| \le 1 \\ \max\ \{x^2, |x|\}, & |x| > 1 \end{cases}$

and $f_2(x) = \begin{cases} \min\{x^2, |x|\}, & |x| > 1 \\ \max\{x^2, |x|\}, & |x| \leq 1 \end{cases}$

and let

$g(x) = \begin{cases} \min\{f(t): -3 \leq t \leq x, & -3 \leq x < 0\} \\ \max\{f(t): 0 \leq t \leq x, & 0 \leq x \leq 3\} \end{cases}$

For $-3 \leq x \leq -1$, the range of g(x) is

A. 1 point

B. 2 points

C. 3 points

D. None of these

Answer: A

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

Consider the functions

$h_1(x) = f(|g(x)|)$ 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 R

    D. None of these

Answer: D

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

Consider the functions

$h_1(x) = f(|g(x)|)$ and $h_2(x) = |f(g(x))|$.

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

A. The domain is R

B. It is periodic with period 2π

C.

D. The range is [0, 1]

Answer: B

Exercise Subjective Type Questions

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

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

3. The number of solutions of $\tan x - mx = 0, m > 1$, in $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$ 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 $\dfrac{x^2}{1 - |x - 2|} = 1$, graphically.

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

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

4. If x and y satisfy the equations $\max\left(|x + y|, |x - y|\right) = 1$ and $|y| = x - [x]$, the number of ordered paris (x, y).
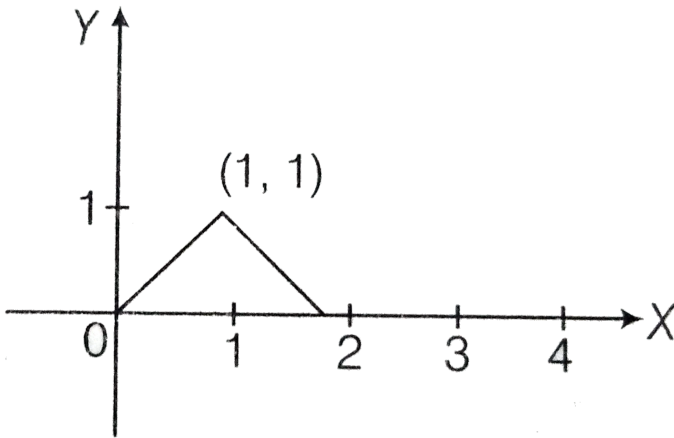
5. Find the area enclosed by

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

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

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

7. Find a formula for the function f graphed as

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

9. Draw the graph for $y = \sqrt{\{x\}}$ and $|y| = \sqrt{\{x\}}$.

10. Draw the graph for $y = -[x] + \sqrt{\{x\}}$.