



MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

GRAPHICAL TRANSFORMATIONS

Illustrations

1. Plot $y = |x|$, $y = |x - 2|$, and $y = |x|^2$



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2. Draw the graph of $y = \sin^{-1}(x - 3)$.



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3. Draw the graph of $y = \log_e(x + 3)$,



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4. Draw the graph of

$$y = \cot^{-1} x + \sec^{-1} x + \operatorname{cosec}^{-1} x.$$



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5. Draw the graph of $y = |x - 3| + 1$.



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6. Solve $|x - 1| - |x + 3| < 6$ graphically



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7. For $a \leq 0$, determine all real roots of the equation (1986, 5M) $x^2 - 2a|x - a| - 3a^2 = 0$



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8. Consider the function

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

the fractional integral function and I is the set of integers. Then find

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



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9. Draw the graph of $y = \log_e 3x$ and compare with $y = \log_e x$.

A. To draw the graph of $y = \log_e 3x$ we draw

the graph of $y = \log_e x$ a

B.

C.

D.

Answer:



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10. Draw the graph of $y = \cos^{-1}(x/4)$ and compare with $y = \cos^{-1} x$.



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11. Draw the graph of $y = 0.5(x - 1)^2$ and compare with $y = (x - 1)^2$.



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



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13. If $n \sin x = \log_e x$ has exactly 1 root, then find the possible value of n ($n \in \mathbb{N}$).



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14. Plot the curve $y = (\log)_e(-x)$.



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15. Draw the graph of $y = 2^{-x}$.



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



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17. Draw the graph of $y = -\cot^{-1}x$.



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18. Draw the graph of $y = -\log_e x$.



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



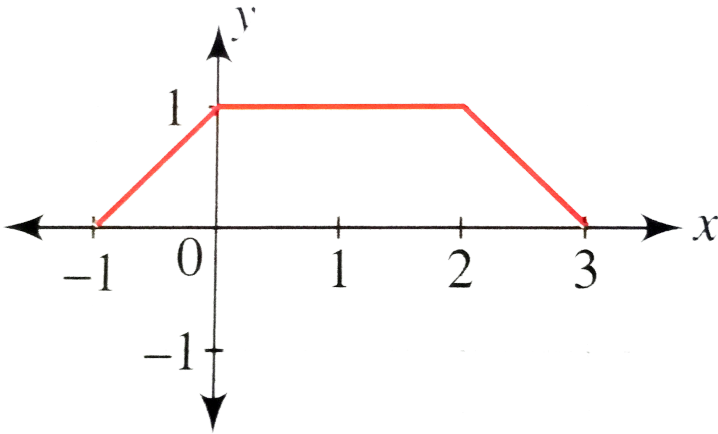
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20. Draw the graph of $y = \sin^{-1}(\cos x)$.



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21. Given the graph of $y = f(x)$.



Draw the graphs of the followin.

(a) $y = f(1 - x)$ (b) $y = -2f(x)$

(c) $y = f(2x)$ (d) $y = 1 - f(x)$



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22. Draw the graph of $y = |\log x|$.



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23. Draw the graph of $y = |\sin x|$ and hence the graph of $y = \sin^{-1}|\sin x|$.



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24. Draw the graph of $y = f(x) = \sqrt{1 - \cos x}$



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25. Draw the graph of $y = |\sin x - 0.5|$.



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26. The number of solution of $2 \cos x = |\sin x|$ where $x \in [0, 4\pi]$ is/are



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27. Solve $|x^2 + 4x + 3| + 2x + 5 = 0$.



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28. Solve $\cos 2x > |\sin x|$, $x \in \left(-\frac{\pi}{2}, \pi\right)$



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29. Prove that the equation $2 \sin x = |x| + a$ has no solution for $a \in \left(\frac{3\sqrt{3} - \pi}{3}, \infty \right)$.



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30. Solve $|x^2 - 1| + |x^2 - 4| < 6$ graphically.



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31. Discuss the differentiability of

$$f(x) = \min\{|x|, |x - 2|, 2 - |x - 1|\}.$$



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32. If the equation $|x^2 + bx + c| = k$ has four real roots, then $b^2 - 4c > 0$ and $0 < k < (4c - b^2)/4$ none of these



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33. Sketch the curve $y = \log|x|$



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34. Draw the graph of $y = \sin|x|$.



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35. Draw the graph of $y = [|x|]$, where $[.]$ denotes the greatest integer function.



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36. Draw the graph of $y = \sin^{-1}|x|$.



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37. Draw the graph of $y = \tan^{-1}|x|$.



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38. Draw the graph of $y = \{|x|\}$, where $\{.\}$ represents the fractional part function.



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39. If $y = x^3 - 3x + 2$, then draw the graph of the followings (i) $y = |x^3 - 3x + 2|$



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40. Draw the graph of $y = \left| 1 - \frac{1}{|x| - 2} \right|$.



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41. Draw the graph of $|y| = |2^{|x|} - 3|$.



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42. Find the total number of solutions to

$$\sin \pi x = |\ln|x||.$$



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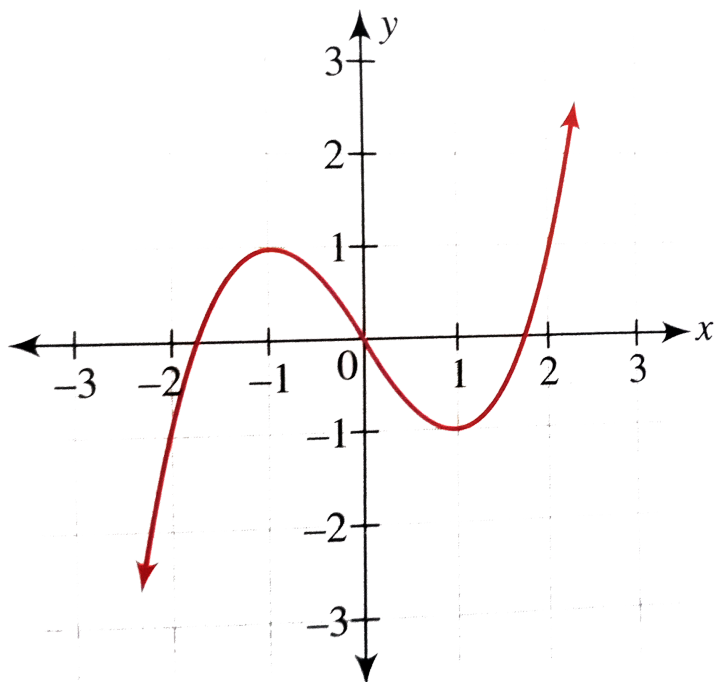
43. Find the number of solutions to

$$7^{|x|} (|1 - |x||) = 1.$$



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44. The graph of the function $y = f(x)$ is shown.



Find the number of solutions to the equation

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



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45. Consider the function $f(x) = x^2 + bx + c$, where $D = b^2 - 4c > 0$, then match the following columns.

Column I	Column II
Values of b and c	Number of points of non-differentiability of $g(x) = f(x) $
(a) $b < 0, c > 0$	(p) 1
(b) $c = 0, b < 0$	(q) 2
(c) $c = 0, b > 0$	(r) 3
(d) $b = 0, c < 0$	(s) 5



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46. Draw the graph of $|y| = \sin x$.



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47. Draw the graph of $|y| = \tan x$.



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48. Sketch the curve $|y| = (x - 1)(x - 2)$.



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49. Draw the graph of $|y| = \{x\}$, where $\{.\}$ represents the fractional part function.



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50. Draw the graph of $|x| + |y| = 1 + x$.



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51. Draw the graph of $|x| - |y| = 2$ using graphical transformation.



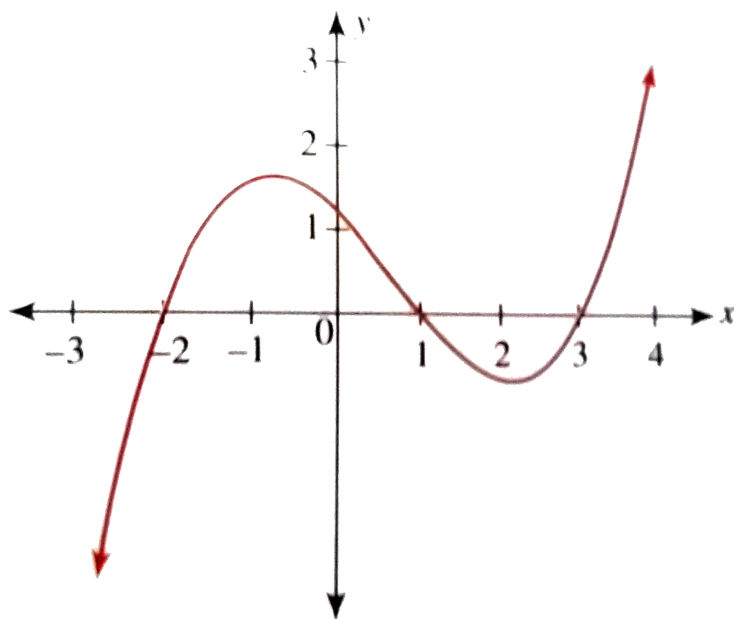
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52. Draw the graph of $|y| = |2^{|x|} - 3|$.



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53. The graph of the function $y = f(x)$ is as shown in the figure.



Then draw the graphs of

(i) $|y| = \operatorname{sgn}(f(x))$ (ii) $|y| = |f(x)|$

(iii) $y = x^{\operatorname{sgn}(f(x))}$



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54. Draw the graph and find the points of discontinuity $f(x) = [2 \cos x]$, $x \in [0, 2\pi]$. ([.] represents the greatest integer function.)



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55. Draw the graph and discuss the continuity of $f(x) = [\sin x + \cos x]$, $x \in [0, 2\pi)$, where [.] represents the greatest integer function.



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56. Draw the graph and find the points of discontinuity for

$$f(x) = [x^2 - x - 1], x \in [-1, 2] \quad ([,] \text{ represents the greatest integer function}).$$



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Exercise

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



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2. Draw the graph of $y = \left| \frac{1}{|x|} - 2 \right|$.



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3. Draw the graph of

$$y = \tan^{-1} x + \cos^{-1} x + \sin^{-1} x.$$



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4. Draw the graph of

$$|y| = (x - 1)(x - 2)(x - 3).$$



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5. Draw the graph of $y = 2 \sin^{-1}(x/3)$.



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6. Draw the graph of $y = \cot^{-1}|x|$.



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7. Draw the graph of $y = \sec^{-1}|x|$.



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8. Draw the graph of $y = |\log_e(x + 3)|$.



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9. Draw the graph of $y = |\log_e|x||$.



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10. Draw the graph of $y = |\{x\} - 0.5|$, where $\{.\}$ represents the fractional part function.



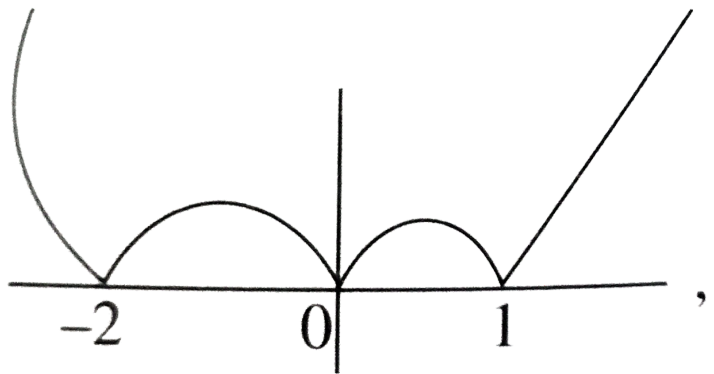
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11. Draw the graph of $y = |\sin x| + \sin|x|$.



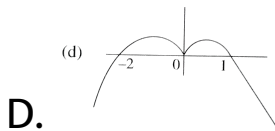
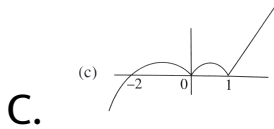
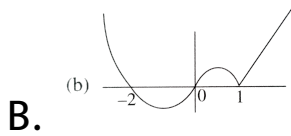
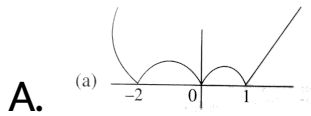
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12. If the graph of $y = |f(x)|$ is as shown in



figure

then the graph of $y = f(x)$ may be



Answer:



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13. The number of real solutions of the equation

$$\sqrt{1 + \cos 2x} = \sqrt{2} \sin^{-1}(\sin x), \quad -\pi \leq x \leq \pi$$

is 0 (b) 1 (c) 2 (d) infinite



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14. Find the number of real solutions to the equation $\log_{0.5}|x| = 2|x|$.



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15. Find the number of points where the function $f(x) = \max |\tan x|, \cos|x|$ is non-differentiable in the interval $(-\pi, \pi)$.



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16. Find the number of points of non-differentiability for $f(x) = \max \{||x| - 1|, 1/2\}$

.



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17. Let $f(x) = \max . \{ |x^2 - 2|x||, |x| \}$ then number of points where $f(x)$ is non derivable, is :



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18. Draw the graph of $|y| = [x]$, where $[.]$ represents the greatest integer function.



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19. Draw the graph of $|2x| + |y| = 2$ using graphical transformation.



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20. Consider the function

$$f(x) = \begin{cases} 2x + 3, & x \leq 1 \\ -x^2 + 6, & x > 1 \end{cases}$$

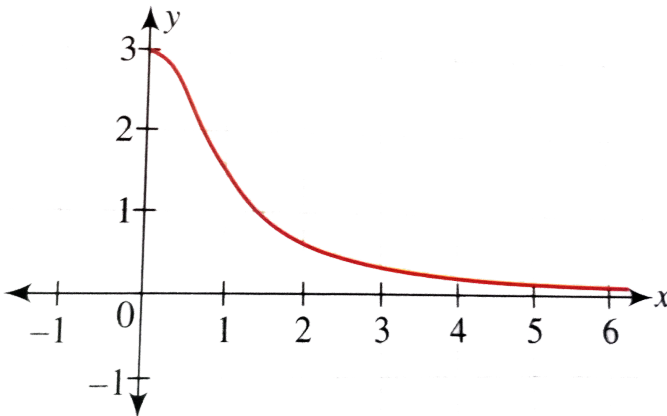
Then draw the graph of the function

$$y = f(x), y = f(|x|), y = |f(x)|, \text{ and } y = |f(x)|.$$



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21. The graph of $y = f(x)$ is as shown in the following figure. Draw the graph of $y = [f(x)]$.



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22. Draw the graph of $y = [4 - x^2]$, $|x| \leq 2$, where $[.]$ represents the greatest integer function.



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