

NOT FOR SALE

CHAPTER P Preparation for Calculus

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INSTRUCTOR USE ONLY

CHAPTER P Preparation for Calculus

Section P.1 Graphs and Models

1. $y = -\frac{3}{2}x + 3$

x -intercept: (2, 0)

y -intercept: (0, 3)

Matches graph (b).

2. $y = \sqrt{9 - x^2}$

x -intercepts: (-3, 0), (3, 0)

y -intercept: (0, 3)

Matches graph (d).

3. $y = 3 - x^2$

x -intercepts: $(\sqrt{3}, 0)$, $(-\sqrt{3}, 0)$

y -intercept: (0, 3)

Matches graph (a).

4. $y = x^3 - x$

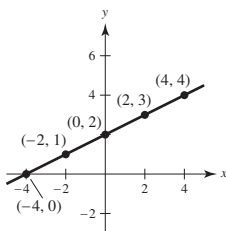
x -intercepts: (0, 0), (-1, 0), (1, 0)

y -intercept: (0, 0)

Matches graph (c).

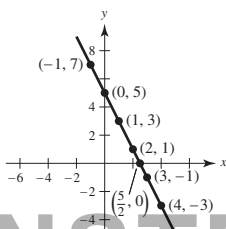
5. $y = \frac{1}{2}x + 2$

x	-4	-2	0	2	4
y	0	1	2	3	4



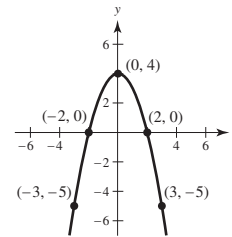
6. $y = 5 - 2x$

x	-1	0	1	2	$\frac{5}{2}$	3	4
y	7	5	3	1	0	-1	-3



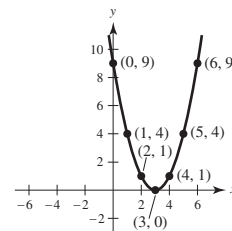
7. $y = 4 - x^2$

x	-3	-2	0	2	3
y	-5	0	4	0	-5



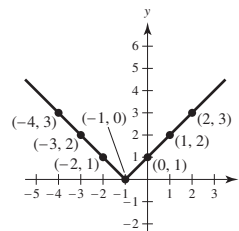
8. $y = (x - 3)^2$

x	0	1	2	3	4	5	6
y	9	4	1	0	1	4	9



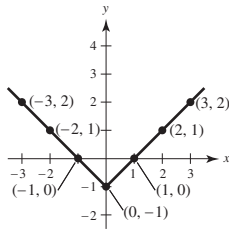
9. $y = |x + 1|$

x	-4	-3	-2	-1	0	1	2
y	3	2	1	0	1	2	3



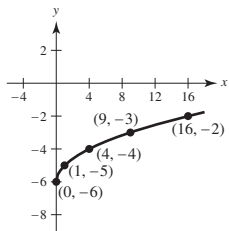
10. $y = |x| - 1$

x	-3	-2	-1	0	1	2	3
y	2	1	0	-1	0	1	2



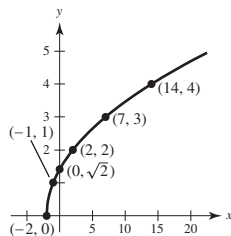
11. $y = \sqrt{x} - 6$

x	0	1	4	9	16
y	-6	-5	-4	-3	-2



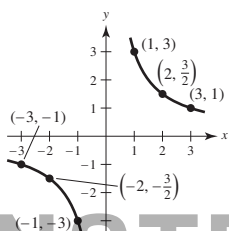
12. $y = \sqrt{x + 2}$

x	-2	-1	0	2	7	14
y	0	1	$\sqrt{2}$	2	3	4



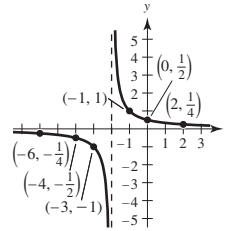
13. $y = \frac{3}{x}$

x	-3	-2	-1	0	1	2	3
y	-1	$-\frac{3}{2}$	-3	Undef.	3	$\frac{3}{2}$	1

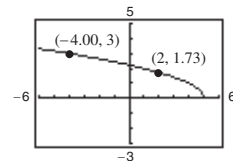


14. $y = \frac{1}{x + 2}$

x	-6	-4	-3	-2	-1	0	2
y	$-\frac{1}{4}$	$-\frac{1}{2}$	-1	Undef.	1	$\frac{1}{2}$	$\frac{1}{4}$



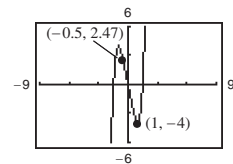
15. $y = \sqrt{5 - x}$



(a) $(2, y) = (2, 1.73)$ ($y = \sqrt{5 - 2} = \sqrt{3} \approx 1.73$)

(b) $(x, 3) = (-4, 3)$ ($3 = \sqrt{5 - (-4)}$)

16. $y = x^5 - 5x$



(a) $(-0.5, y) = (-0.5, 2.47)$

(b) $(x, -4) = (-1.65, -4)$ and $(x, -4) = (1, -4)$

17. $y = 2x - 5$

y -intercept: $y = 2(0) - 5 = -5$; $(0, -5)$

x -intercept: $0 = 2x - 5$

$5 = 2x$

$x = \frac{5}{2}$; $(\frac{5}{2}, 0)$

18. $y = 4x^2 + 3$

y -intercept: $y = 4(0)^2 + 3 = 3$; $(0, 3)$

x -intercept: $0 = 4x^2 + 3$

$-3 = 4x^2$

None (y cannot equal 0.)

19. $y = x^2 + x - 2$

y-intercept: $y = 0^2 + 0 - 2$

$y = -2; (0, -2)$

x-intercepts: $0 = x^2 + x - 2$

$0 = (x + 2)(x - 1)$

$x = -2, 1; (-2, 0), (1, 0)$

20. $y^2 = x^3 - 4x$

y-intercept: $y^2 = 0^3 - 4(0)$

$y = 0; (0, 0)$

x-intercepts: $0 = x^3 - 4x$

$0 = x(x - 2)(x + 2)$

$x = 0, \pm 2; (0, 0), (\pm 2, 0)$

21. $y = x\sqrt{16 - x^2}$

y-intercept: $y = 0\sqrt{16 - 0^2} = 0; (0, 0)$

x-intercepts: $0 = x\sqrt{16 - x^2}$

$0 = x\sqrt{(4 - x)(4 + x)}$

$x = 0, 4, -4; (0, 0), (4, 0), (-4, 0)$

22. $y = (x - 1)\sqrt{x^2 + 1}$

y-intercept: $y = (0 - 1)\sqrt{0^2 + 1}$

$y = -1; (0, -1)$

x-intercept: $0 = (x - 1)\sqrt{x^2 + 1}$

$x = 1; (1, 0)$

23. $y = \frac{2 - \sqrt{x}}{5x + 1}$

y-intercept: $y = \frac{2 - \sqrt{0}}{5(0) + 1} = 2; (0, 2)$

x-intercept: $0 = \frac{2 - \sqrt{x}}{5x + 1}$

$0 = 2 - \sqrt{x}$

$x = 4; (4, 0)$

24. $y = \frac{x^2 + 3x}{(3x + 1)^2}$

y-intercept: $y = \frac{0^2 + 3(0)}{[3(0) + 1]^2}$

$y = 0; (0, 0)$

x-intercepts: $0 = \frac{x^2 + 3x}{(3x + 1)^2}$

$0 = \frac{x(x + 3)}{(3x + 1)^2}$

$x = 0, -3; (0, 0), (-3, 0)$

25. $x^2y - x^2 + 4y = 0$

y-intercept: $0^2(y) - 0^2 + 4y = 0$

$y = 0; (0, 0)$

x-intercept: $x^2(0) - x^2 + 4(0) = 0$

$x = 0; (0, 0)$

26. $y = 2x - \sqrt{x^2 + 1}$

y-intercept: $y = 2(0) - \sqrt{0^2 + 1}$

$y = -1; (0, -1)$

x-intercept: $0 = 2x - \sqrt{x^2 + 1}$

$2x = \sqrt{x^2 + 1}$

$4x^2 = x^2 + 1$

$3x^2 = 1$

$x^2 = \frac{1}{3}$

$x = \pm \frac{\sqrt{3}}{3}$

$x = \frac{\sqrt{3}}{3}; \left(\frac{\sqrt{3}}{3}, 0\right)$

Note: $x = -\sqrt{3}/3$ is an extraneous solution.

27. Symmetric with respect to the y-axis because

$y = (-x)^2 - 6 = x^2 - 6.$

28. $y = x^2 - x$

No symmetry with respect to either axis or the origin.

29. Symmetric with respect to the x-axis because

$(-y)^2 = y^2 = x^3 - 8x.$

30. Symmetric with respect to the origin because

$$\begin{aligned}(-y) &= (-x)^3 + (-x) \\ -y &= -x^3 - x \\ y &= x^3 + x.\end{aligned}$$

31. Symmetric with respect to the origin because

$$(-x)(-y) = xy = 4.$$

32. Symmetric with respect to the x-axis because

$$x(-y)^2 = xy^2 = -10.$$

33. $y = 4 - \sqrt{x + 3}$

No symmetry with respect to either axis or the origin.

34. Symmetric with respect to the origin because

$$\begin{aligned}(-x)(-y) - \sqrt{4 - (-x)^2} &= 0 \\ xy - \sqrt{4 - x^2} &= 0.\end{aligned}$$

35. Symmetric with respect to the origin because

$$\begin{aligned}-y &= \frac{-x}{(-x)^2 + 1} \\ y &= \frac{x}{x^2 + 1}.\end{aligned}$$

36. Symmetric with respect to the y-axis because

$$y = \frac{(-x)^2}{(-x)^2 + 1} = \frac{x^2}{x^2 + 1}.$$

37. Symmetric with respect to the y-axis because

$$y = |(-x)^3 + (-x)| = |-(x^3 + x)| = |x^3 + x|.$$

38. Symmetric with respect to the x-axis because

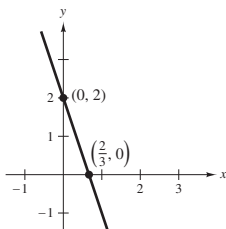
$$\begin{aligned}|-y| - x &= 3 \\ |y| - x &= 3.\end{aligned}$$

39. $y = 2 - 3x$

$$\begin{aligned}y &= 2 - 3(0) = 2, \text{ y-intercept} \\ 0 &= 2 - 3(x) \Rightarrow 3x = 2 \Rightarrow x = \frac{2}{3}, \text{ x-intercept}\end{aligned}$$

Intercepts: $(0, 2), (\frac{2}{3}, 0)$

Symmetry: none



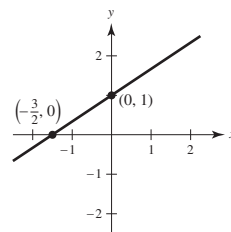
40. $y = \frac{2}{3}x + 1$

$$y = \frac{2}{3}(0) + 1 = 1, \text{ y-intercept}$$

$$0 = \frac{2}{3}x + 1 \Rightarrow -\frac{2}{3}x = 1 \Rightarrow x = -\frac{3}{2}, \text{ x-intercept}$$

Intercepts: $(0, 1), (-\frac{3}{2}, 0)$

Symmetry: none



41. $y = 9 - x^2$

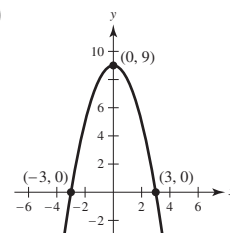
$$y = 9 - (0)^2 = 9, \text{ y-intercept}$$

$$0 = 9 - x^2 \Rightarrow x^2 = 9 \Rightarrow x = \pm 3, \text{ x-intercepts}$$

Intercepts: $(0, 9), (3, 0), (-3, 0)$

$$y = 9 - (-x)^2 = 9 - x^2$$

Symmetry: y-axis



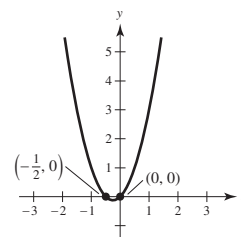
42. $y = 2x^2 + x = x(2x + 1)$

$$y = 0(2(0) + 1) = 0, \text{ y-intercept}$$

$$0 = x(2x + 1) \Rightarrow x = 0, -\frac{1}{2}, \text{ x-intercepts}$$

Intercepts: $(0, 0), (-\frac{1}{2}, 0)$

Symmetry: none



43. $y = x^3 + 2$

$$y = 0^3 + 2 = 2, \text{ y-intercept}$$

$$0 = x^3 + 2 \Rightarrow x^3 = -2 \Rightarrow x = -\sqrt[3]{2}, \text{ x-intercept}$$

Intercepts: $(-\sqrt[3]{2}, 0), (0, 2)$

Symmetry: none

