

1. Simplify an expression:

(a) $5x + 1 - [3(x - 2) - 4]$

(b) $|-5|x + \frac{2x}{x^{-4}} - [2(x^2 - 3) - 4]$

2. Factor:

(a) $x^3 - 5x^2 + 3x - 15$

(b) $x^2 + 7x + 12$

(c) $2x^2 - 8x - 10$

3. Solve (find all real solutions):

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

(b) $x^3 - 2x^2 + 6x - 12 = 0$

(c) $x^2 - 5x = 0$

4. Rationalize the denominator:

(a) $\frac{3}{3 + \sqrt{7}}$

(b) $\frac{5i}{2 + i}$

5. Find the distance and midpoint:

(a) $(2, 3)$ and $(-1, 2)$

(b) $(1, 4)$ and $(3, 2)$

6. Describe the shift and sketch the graph:

(a) $y = -|x + 1|$

(b) $y = (x - 1)^2 + 2$

7. Functions: $f(x) = x^2 - 2x + 1$ and $g(x) = \sqrt{x}$

(a) Find $f(x) + g(x)$

(b) Find $f(g(x))$

(c) Find $g(f(x))$

(d) Find $g(x) - f(x)$

8. Find the inverse:

(a) $f(x) = 3x - 1$

(b) $f(x) = \sqrt{x + 1} + 2$

9. Find the center and radius of the circle:

(a) $(x - 1)^2 + (y + 2)^2 = 9$

(b) $x^2 + y^2 - 2x + 4y + 1 = 0$

10. Find the slope:

(a) $(1, 3)$ and $(4, 7)$

11. Find the equation of a line:

(a) $(1, 3)$ and $(4, -2)$

(b) $(1, 2)$ and $(3, 4)$

(c) $(4, -7)$ and $(4, 3)$

(d) $(1, 2)$ and $(6, 2)$

12. Find the equation of a perpendicular line:

(a) Through the point $(1, -2)$ and perpendicular to $3x - 9y = 12$

13. Find the average rate of change:

(a) $f(x) = (3 - x)^2$ from $a = 1$ to $b = 3$

14. Find the difference quotient:

(a) $f(x) = -2x + 3$

(b) $f(x) = x^2 - x$

15. Graphs. Given the below graph, find:

(a) Domain: _____

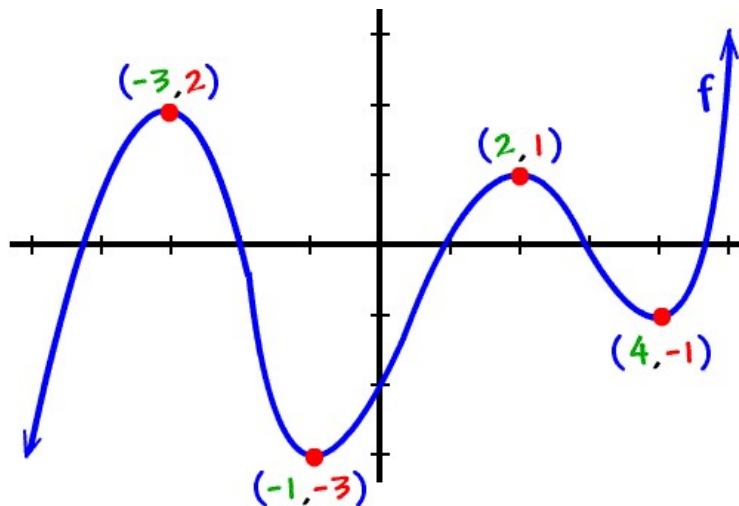
(b) Range: _____

(c) Increasing: _____

(d) Decreasing: _____

(e) Relative Maximum: _____

(f) Relative Minimum: _____



16. Find the degree, leading term and leading coefficient:

(a) $f(x) = 5x^3 + 2x + 9$

17. Find the behavior, zeros, multiplicity, where it crosses/touches x-axis, y-intercept, number line to find when the function is above or below x-axis, and sketch.

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

(b) $f(x) = -(x - 1)^2(x)(x + 1)$

18. Find the vertex:

(a) $f(x) = 2x^2 - 8x + 9$

(b) $f(x) = x^2 - 4x + 5$

19. Long Division:

(a) $(x^3 + 3x^2 + 3x + 1) \div (x^2 + 2x + 1)$

20. Synthetic Division:

(a) $(x^3 - 3x^2 + 3x - 1) \div (x - 1)$

21. Find possible rational zeros:

(a) $f(x) = 2x^4 - 5x^2 - 2x + 1$

22. Find the domain, vertical asymptotes and horizontal asymptotes:

(a) $f(x) = \frac{2x^2 - 2}{x^2 + 2x - 3}$

(b) $f(x) = \frac{x^2 + 2x + 1}{x + 2}$

(c) $f(x) = \frac{x}{x^2}$

23. Simple and Compound Interest:

(a) Find the simple interest for $P = \$5000$, $r = 15\%$, $t = 6$ years.

(b) Find the future value of $P = \$6500$ at 9% compounded quarterly for 12 years.

24. Graph:

(a) $f(x) = 2^x$

(b) $f(x) = \left(\frac{1}{2}\right)^x$

25. Evaluate logarithm:

(a) $\log_3\left(\frac{1}{3}\right)$

(b) $\log_2(8)$

(c) $\ln(e^3)$

26. Condense:

(a) $\log x + \log(x^2 + 5) - \log(x - 3) - \log(x^2 + 2)$

27. Expand:

(a) $\ln \frac{x(x-1)}{(x+1)^2}$

28. Solve:

(a) $x = \ln \sqrt{e}$

(b) $2^{x-2} = 16$

(c) $5^{2x+1} = 3^{x-1}$

(d) $\log_2(x) + \log_2(x+2) = 3$

(e) $2^{2x} - 4 \cdot 2^x = 21$

29. Evaluate:

(a) $\cos(135^\circ)$

(b) $\sec(\pi)$

(c) $\csc(30^\circ)$

30. Find the six trigonometric values:

(a) Given the point $(-1, -2)$ on the terminal side of an angle

31. Given $\cot(\theta) = -\frac{1}{3}$ and θ is in quadrant II,

(a) Find $\sin(\theta)$

(b) Find $\cos(\theta)$

32. Sketch (show 4 step process from class):

(a) $y = 2 \sin(x) + 3$

33. Given $y = -6 \cos[\frac{1}{2}(x + 2)]$

- (a) Find the amplitude
- (b) Find the period
- (c) Find the phase shift

34. Evaluate:

- (a) $\sin^{-1}(-\frac{1}{2})$
- (b) $\cos^{-1}(-1)$

35. Find the inverse:

(a) $f(x) = \tan(x - 1) + 2$

36. Simplify using the product-to-sum formula:

(a) $\cos(64^\circ) \cos(4^\circ)$

37. Find the exact values:

- (a) $\sin(41^\circ) \cos(49^\circ) + \cos(41^\circ) \sin(49^\circ)$
- (b) $2 \sin(75^\circ) \cos(75^\circ)$
- (c) $\frac{2 \tan(15^\circ)}{1 - \tan^2(15^\circ)}$

38. Verify:

(a) $\sin x \tan x + \cos x = \tan x \csc x$

39. Solve by finding the general solution and all the solutions between $[0, 2\pi)$:

- (a) $\sin(2x - \frac{\pi}{3}) = \frac{1}{2}$
- (b) $(\tan x + 1)(2 \sin x - 1) = 0$

40. Solve using method of addition or substitution:

- (a)
$$\begin{cases} 2x - y = 5 \\ -4x + 2y = 7 \end{cases}$$
- (b)
$$\begin{cases} x + y = 3 \\ 3x + y = 1 \end{cases}$$