

1. If $x+2$ is a factor of $3x^3 + kx^2 - 31x - 54$, then the value of k is _____
- A. -8 C. -4
B. -51 D. 4
2. The zeros of the polynomial function $f(x) = 2x^3 - 8x^2 + 6x$ is _____
- A. $x = 0, 1, 3$ C. $x = 1, 2, 3$
B. $x = 0, -1, -3$ D. $x = 0, 1, -4$
3. The function $f(x) = \frac{(x-1)(x+1)(x+3)}{(x-4)(x-1)(2x+5)}$ has _____
- A. vertical asymptotes at $x = 4, x = 1$ and $x = -\frac{5}{2}$ and a horizontal asymptote at $y = 2$.
B. vertical asymptotes at $x = 4$ and $x = -\frac{5}{2}$ and a horizontal asymptote at $y = \frac{1}{2}$.
C. vertical asymptotes at $x = 4, x = 1$ and $x = -\frac{5}{2}$ and a horizontal asymptote at $y = \frac{1}{2}$.
D. vertical asymptotes at $x = 4$ and $x = -\frac{5}{2}$ and a horizontal asymptote at $y = 2$.
4. Given $f(x) = \frac{-2(x+3)(x-12)}{(x+1)}$, which of the following statements is **true**? _____
- A. The y -intercept is at $(0, 72)$.
B. The function has a horizontal asymptote at $y = 2$.
C. There is a vertical asymptote at $x = -2$.
D. The x -intercepts are at $x = 3$ and $x = -12$.
5. The expression $\frac{1}{3}\sin\left(\frac{\theta}{3}\right)\cos\left(\frac{\theta}{3}\right)$ is equivalent to _____
- A. $\frac{1}{3}\sin\left(\frac{\theta}{3}\right)$ B. $\frac{1}{6}\sin\left(\frac{\theta}{3}\right)$ C. $\frac{1}{6}\sin\left(\frac{2\theta}{3}\right)$ D. $\frac{1}{3}\sin\left(\frac{2\theta}{3}\right)$
6. 110° converted to radians is approximately equal to _____
- A. 1.92 B. 0.61 C. 1.64 D. 6,302.54
7. The minimum value of the function $y = 3\sin[5\pi(\theta - 4)] - 1$ is _____
- A. -4 B. 3 C. 4 D. 5

8. Which statement is **false** for the graph of $y = -2 \sin \left[\frac{\pi}{5}(x+2) \right] - 6$? _____

- I. The amplitude is 2.
 II. The period is 10.
 III. The phase shift is 2 units to the right.
 IV. The vertical displacement is 6 units down.

- A. I B. II C. III D. IV
9. The x -intercept of the graph of $y = \log_2(x+4) + 1$ is _____

- A. -4 B. -3.9 C. -3.5 D. -3

10. Solve for x : $\log_3 x = \log_3 4 + \log_3 5$. _____

- A. 9 B. 20 C. 1.30 D. 2.73

11. If $f(5) = -1$, $g(5) = 2$, $g(1) = 5$ and $f(1) = 4$, then $(f \circ g)(1)$ equals _____

- A. 20 B. -1 C. 4 D. cannot be determined

12. Suppose $f(x) = 2\cos(x)$ and $g(x) = \sin(x)$. Which of these expressions is equivalent to $(f \times g)\left(\frac{\pi}{16}\right)$? _____

- A. $\cos\left(\frac{\pi}{8}\right)$ B. $\cos\left(\frac{\pi}{4}\right)$ C. $\sin\left(\frac{\pi}{8}\right)$ D. $\sin\left(\frac{\pi}{4}\right)$

13. Given $f(x) = \frac{2}{x} - 4$ and $g(x) = \sqrt{1-x^2}$ determine the following. Fully simplify.

a. $\frac{f(x+h) - f(x)}{h}$

b. $g(2-h)$

14. The height of a miniature rocket above the ground is modeled by $h(t) = -5t^2 + 5t + 120$, where $h(t)$ is the height in metres and t is time in seconds. Estimate the IROC at $t = 2$ seconds.

15. Solve the following. Note: For Part b. use interval notation.

a. $4x^3 - x^2 - 11x - 6 = 0$

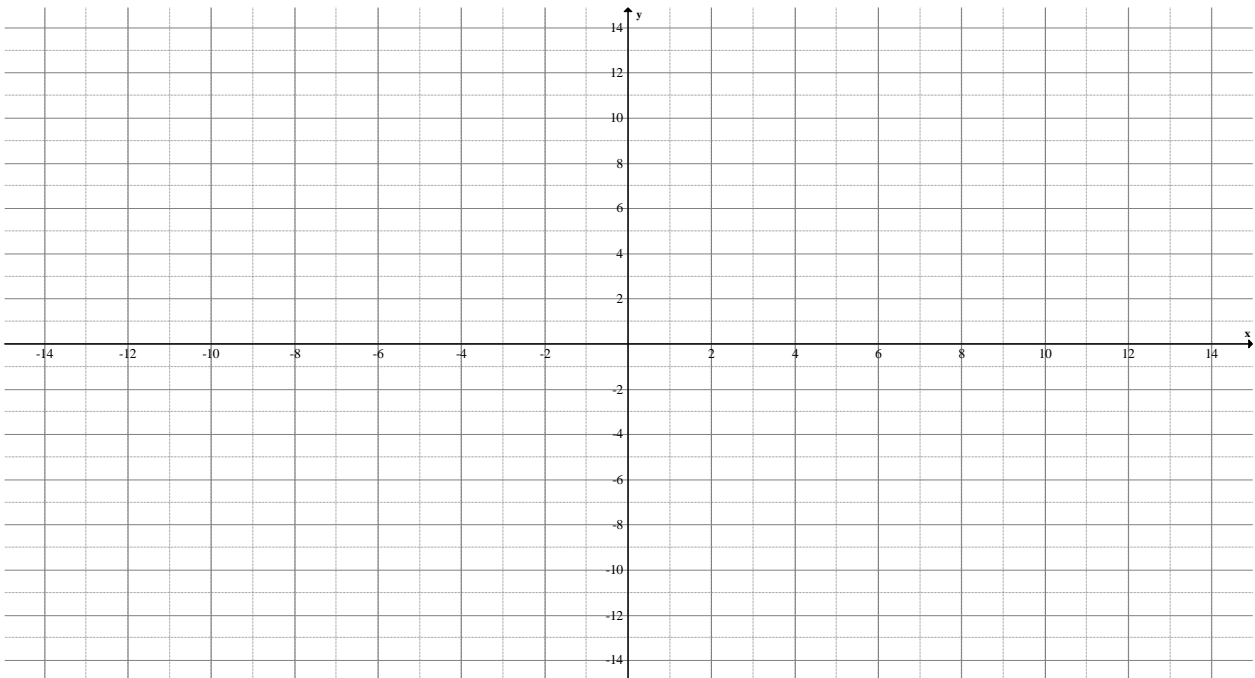
b. $-(x^2 + 7x - 30)(9 - x^2) > 0$

16. Rationalize by multiplying by the conjugate and simplify where appropriate.

a. $\frac{\sqrt{x+4} - 2}{x}$

b. $\frac{\sqrt{x+2} - 2}{\sqrt{x+7} - 3}$

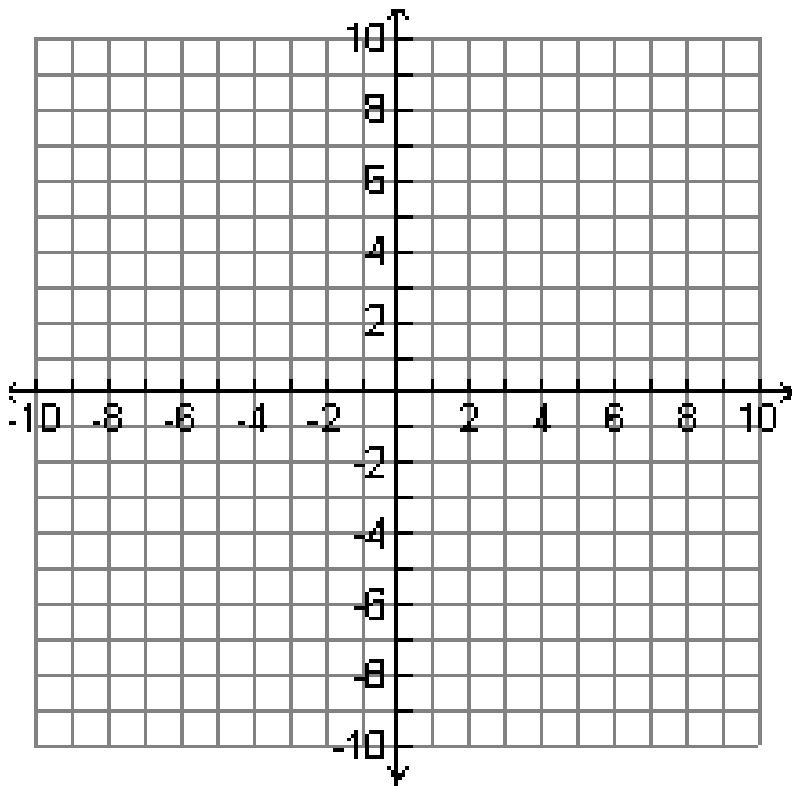
17. Sketch and properly label the graph $f(x) = \frac{4(x-3)(x^2+6x+9)}{(x^2-4)(x^2-9)}$.



18. Graph the piecewise function, $f(x) = \begin{cases} -x^2 + x + 2, & x \leq -1 \\ x + 3, & -1 < x < 2 \\ -\frac{3}{2}x + 8, & x \geq 2 \end{cases}$

Determine

- i. $f(-4) =$
- ii. $f(0) =$
- iii. $f(4) =$
- iv. $f(2) =$



19. Sketch the graph of $f(x) = -\frac{1}{2}(x-2)(x+1)^2(x+3)^3$. Label all x -intercept(s), the y -intercept, bounces and points of inflection.

