1. What is the equation for the axis of symmetry of the quadratic function \( f(x) = x^2 - 6x + 5 \)?
   (a) \( x = 1 \)  (b) \( x = -1 \)  (c) \( x = 2 \)  (d) \( x = -2 \)  (e) \( x = 3 \)  (f) \( x = -3 \)

2. Form a polynomial of degree three with real coefficients so that \( 2 + i \) and \( -1 \) are zeros.
   (a) \( x^3 + 3x^2 + x - 5 \)  (b) \( x^3 - 3x^2 - x - 5 \)  (c) \( x^3 - 3x^2 + x + 5 \)  (d) \( x^3 + 3x^2 - x + 5 \)  (e) \( x^3 - 3x^2 - x + 5 \)  (f) \( x^3 - 3x^2 + x - 5 \)

3. Let \( R(x) = \frac{2x^4 + x^3 + 3x^2 + 2x - 4}{x^3 - x^2 + x - 1} \). Then \( R(x) \) has an oblique asymptote at:
   (a) \( y = 2x + 3 \)  (b) \( y = 2x + 2 \)  (c) \( y = 2x + 1 \)  (d) \( y = 2x - 1 \)  (e) \( y = 2x - 2 \)  (f) \( y = 2x - 3 \)

4. Solve the inequality: \( \frac{x(x + 5)^2}{x^2 - 1} > 0 \)
   (a) \( (-\infty, -5) \cup (-1, 0) \cup (0, 1) \)  (b) \( (-\infty, -5) \cup (-1, 1) \)  (c) \( (-1, 0) \cup (1, \infty) \)  (d) \( (-\infty, -5] \cup (-1, 1) \)  (e) \( [-5, -1) \cup \{0\} \cup (1, \infty) \)  (f) All real numbers.

5. Solve the inequality: \( \frac{5x}{x + 3} > 2 \).
   (a) \( (-3, 2) \)  (b) \( (-\infty, -3) \cup (2, \infty) \)  (c) \( (-3, -2) \)  (d) \( (-\infty, -3) \cup [2, \infty) \)  (e) \( (-2, 3) \)

6. Find \( k \) so that \( (x + 1) \) is a factor of \( x^{99} + kx^2 - kx + 3 \).
   (a) \( k = -5 \)  (b) \( k = -3 \)  (c) \( k = -1 \)  (d) \( k = 1 \)  (e) \( k = 3 \)  (f) \( k = 5 \)

7. What is the remainder when \( x^{1000} + 27x^{997} + 2x^2 + 4x - 7 \) is divided by \( x + 3 \)?
   (a) \( -2 \)  (b) \( -1 \)  (c) \( 0 \)  (d) \( 1 \)  (e) \( 2 \)  (f) \( 3 \)
8. Let \( f(x) = 3x^4 - 7x^2 - 20 \). Which of the following statements is true?

(a) The real zeros of \( f(x) \) are \( \pm \sqrt{3} \) and the imaginary zeros are \( \pm 2i \).
(b) The real zeros of \( f(x) \) are \( \pm 2 \) and the imaginary zeros are \( \pm \sqrt{3} i \).
(c) The real zeros of \( f(x) \) are \( \pm \sqrt{5} \) and the imaginary zeros are \( \pm 2i \).
(d) The real zeros of \( f(x) \) are \( \pm 2 \) and the imaginary zeros are \( \pm \sqrt{5} \frac{3}{3} i \).
(e) The real zeros of \( f(x) \) are \( \pm 2 \) and the imaginary zeros are \( \pm \sqrt{5} i \).

9. Find the domain for the function graphed below.

(a) all real numbers \( x \)
(b) \( \{x| -2 \leq x \leq 0\} \)
(c) \( \{x| -3 \leq x \leq 0\} \)
(d) \( \{x| -3 \leq x \leq 3\} \)
(e) \( \{x| x \geq -3\} \)

10. If the number \( y \) is in the range of \( f(x) = \frac{2x + 3}{1 - x} \), then which of the following must be true?

(a) \( y \neq -2 \)  (b) \( y \neq -1 \)  (c) \( y \neq 0 \)  (d) \( y \neq 1 \)  (e) \( y \neq 2 \)  (f) \( y \neq 3 \)

11. The equation \( 2^{x^2} = \frac{8}{2^x} \) has two solutions. Find the sum of the two solutions.

(a) \(-2\)  (b) \(-1\)  (c) \(0\)  (d) \(1\)  (e) \(2\)  (f) \(3\)

12. The equation \( \log_3(x^2 + x + 25) = 3 \) has two solutions. Find the sum of the two solutions.

(a) \(-2\)  (b) \(-1\)  (c) \(0\)  (d) \(1\)  (e) \(2\)  (f) \(3\)

13. Select the function that best describes the given graph.

(a) \( f(x) = 2^x \)
(b) \( f(x) = 2^{x-1} \)
(c) \( f(x) = 2^{x-2} \)
(d) \( f(x) = 2^{x+1} \)
(e) \( f(x) = 2^{x+2} \)
14. Solve the equation $2e^{5x} = \frac{3}{e^2}$ for $x$.
   (a) $\frac{\ln 3}{2}$  (b) $\frac{\ln 3 - \ln 2 - 2}{5}$  (c) $\frac{\ln 3 - \ln 2 - 2e}{5}$
   (d) $\frac{\ln 3 - \ln 2 - 1}{5}$  (e) $\frac{\ln 3 - \ln 2 + 1}{5}$

15. Use properties of logarithms to find the exact value of the expression $\log_5 27 \cdot \log_3 10 \cdot \log_{10} 5$.
   (a) 3  (b) 6  (c) 1  (d) $-3$  (e) $-6$  (f) 7

16. If $\log_a x = 2$, $\log_a y = 4$, and $\log_a z = 5$, find the value of $\log_a \left( \frac{x^3 \sqrt{y^2}}{z^5} \right)$.
   (a) $-2$  (b) $-1$  (c) 0  (d) 1  (e) 2  (f) 3

17. How many years would it take an amount of money to quadruple (4 times) if it is invested at 8% compounded continuously?
   (a) $\frac{2 \ln 4}{25}$  (b) $\frac{\ln 100}{2}$  (c) $\frac{25 \ln 2}{4}$  (d) $\frac{25 \ln 4}{2}$  (e) $4 \ln 3$  (f) $0.04 \ln 3$

18. Write an equation for the parabola.
   (a) $y = 2x^2 + 4x + 3$
   (b) $y = 2x^2 + 4x - 3$
   (c) $y = 2x^2 - 4x + 3$
   (d) $y = 2x^2 - 4x - 3$
   (e) $y = x^2 + 2x + 3$
   (f) $y = 3x^2 + 6x + 3$

19. Which of the following conics is represented by the equation $4(x - 2)^2 - y + 36 = 0$?
   (a) Circle  (b) Ellipse  (c) Parabola  (d) Hyperbola  (e) None of these

20. Find the foci of the ellipse $\frac{(x + 1)^2}{16} + \frac{(y - 2)^2}{25} = 1$.
   (a) (1,-1) and (1,5)  (b) (-1,-1) and (-1,5)  (c) (-4,2) and (2,2)  (d) (-4,-2) and (2,-2)  (e) (4,2) and (6,2)

21. Solve the system of equations for $y$.
   \[
   \begin{align*}
   x + y - z &= 4 \\
   x - y + z &= 2 \\
   x + y + z &= 6 \\
   \end{align*}
   \]
   (a) $y = 1$  (b) $y = 2$  (c) $y = 3$  (d) $y = 4$  (e) $y = 5$
22. If \( \frac{4x - 9}{x^2 - 3x + 2} = \frac{A}{x - 1} + \frac{B}{x - 2} \)

(a) \(A + B = 1\)  (b) \(A + B = 2\)  (c) \(A + B = 3\)  (d) \(A + B = 4\)  (e) \(A + B = 5\)

23. Find the infinite geometric sum \(1 - \frac{1}{4} + \frac{1}{16} - \frac{1}{64} + \cdots\).

(a) 5  (b) \(\frac{5}{2}\)  (c) \(\frac{4}{5}\)  (d) \(\frac{4}{3}\)  (e) \(\frac{8}{3}\)

24. Write \(2.27\) as a fraction in simplest form.

(a) \(\frac{235}{99}\)  (b) \(\frac{79}{33}\)  (c) \(\frac{77}{33}\)  (d) \(\frac{26}{11}\)  (e) \(\frac{25}{11}\)

25. Find the constant term in the expansion of \(\left(\frac{x^2 - \frac{1}{x^2}}{x^4}\right)^8\).

(a) 70  (b) \(-70\)  (c) 28  (d) \(-28\)  (e) 56  (f) \(-56\)

26. Find the coefficient of \(x^{39}\) in \((x - 1)^{41}\).

(a) 820  (b) \(-820\)  (c) 41  (d) \(-41\)  (e) 410  (f) \(-410\)

27. How many ways can you arrange the letters in the word \(MISSISSIPPI\)?

(a) 3,960  (b) 6,930  (c) 34,650  (d) 4,360  (e) 1,000

28. How many ways can a president, vice-president, and secretary be elected from a class of 12 people?

(a) 720  (b) 1320  (c) 36  (d) 220  (e) 72

29. Determine the probability of not getting 7 when rolling 2 fair dice.

(a) \(\frac{35}{36}\)  (b) \(\frac{11}{12}\)  (c) \(\frac{2}{3}\)  (d) \(\frac{3}{4}\)  (e) \(\frac{5}{6}\)

30. Three people randomly choose integers between 1 and 6 inclusive. What is the probability that at least two of them choose the same number?

(a) \(\frac{1}{9}\)  (b) \(\frac{2}{9}\)  (c) \(\frac{3}{3}\)  (d) \(\frac{4}{9}\)  (e) \(\frac{5}{9}\)
1. E
2. C
3. A
4. C
5. B
6. C
7. B
8. D
9. D
10. A
11. A
12. B
13. C
14. B
15. A
16. E
17. D
18. A
19. C
20. B
21. B
22. D
23. C
24. E
25. A
26. A
27. C
28. B
29. E
30. D