1. Which type of conic is represented by \( x^2 - 3y^2 + 8x - 6y + 4 = 0 \)?
   (a) Circle  (b) Hyperbola  (c) Parabola  (d) Ellipse  (e) None of these

2. Find the center of the ellipse \( y^2 + 4x^2 - 4y + 8x - 4 = 0 \)
   (a) (1, 2)  (b) (-1, 2)  (c) (2, 1)  (d) (2, 4)  (e) (4, -2)

3. Find the asymptotes of the hyperbola \( y^2 - 9x^2 = 9 \)
   (a) \( y = 3x \)  (b) \( y = -\frac{1}{3}x \)  (c) \( y = \pm x \)  (d) \( y = \pm \frac{1}{5}x \)  (e) \( y = \pm 9x \)

4. Solve the following system of equations. Find \( z \).
   \[
   \begin{align*}
   x - 2y + 3z &= 7 \\
   2x + y + z &= 4 \\
   -3x + 2y - 2z &= -10
   \end{align*}
   \]
   (a) 2  (b) -1  (c) 1  (d) -2  (e) 7

5. Find \( A \cdot B \).
   \[
   \frac{3x}{(x + 2)(x - 4)} = \frac{A}{x + 2} + \frac{B}{x - 4}
   \]
   (a) 0  (b) 1  (c) 2  (d) 4  (e) 6

6. Solve the following system of equations. Find \( x \cdot y \).
   \[
   \begin{align*}
   5x - y &= 13 \\
   2x + 3y &= 12
   \end{align*}
   \]
   (a) 5  (b) 12  (c) 1  (d) 6  (e) 4  (f) -3
7. What form would be used to find the partial fraction decomposition of
\[
\frac{10x^2 + 2x}{x^2(x - 1)^2(x^2 + 2)}?
\]
(a) \[\frac{A}{x^2} + \frac{B}{(x - 1)^2} + \frac{C}{x^2 + 2}\]
(b) \[\frac{Ax + B}{x^2} + \frac{Cx + D}{(x - 1)^2} + \frac{Ex + F}{x^2 + 2}\]
(c) \[\frac{A}{x} + \frac{Bx + C}{x^2} + \frac{D}{x - 1} + \frac{Ex + F}{(x - 1)^2} + \frac{Gx + H}{x^2 + 2}\]
(d) \[\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x - 1} + \frac{D}{(x - 1)^2} + \frac{E}{x^2 + 2}\]
(e) \[\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x - 1} + \frac{D}{(x - 1)^2} + \frac{Ex + F}{x^2 + 2}\]

8. How many solutions does the following system equations have?
\[
\begin{align*}
\begin{cases}
x^2 + y^2 &= 4 \\
y - x &= 2
\end{cases}
\end{align*}
\]
(a) 0 (b) 1 (c) 2 (d) 3 (e) 4 (f) none of these

9. Solve the following system of equations. Find the sum of the y-coordinates of all solutions.
\[
\begin{align*}
\begin{cases}
x^2 - y^2 &= 21 \\
x + y &= 7
\end{cases}
\end{align*}
\]
(a) 2 (b) 5 (c) \[\frac{1}{3}\] (d) 3 (e) \[\frac{5}{9}\] (f) 7

10. Find the third term of the sequence given recursively by \(a_1 = 5; a_n = 2a_{n-1} \).
(a) 5 (b) 10 (c) 20 (d) 30 (e) 40

11. Find the sum
\[\sum_{k=1}^{6} (3k - 7)\]
(a) 0 (b) 105 (c) 63 (d) 21 (e) 11
12. Find the 5th term of the sequence of 
\[ (-1)^{n-1} \frac{n}{2n-1} \]
(a) \(-\frac{5}{9}\) (b) \(\frac{4}{7}\) (c) \(\frac{6}{11}\) (d) 5 (e) \(\frac{5}{9}\) (f) none of these

13. Find the 157th term of the arithmetic sequence \(-1, 1, 3, \ldots\)
(a) 307 (b) 309 (c) 311 (d) 313 (e) 315

14. Find the sum \(2 + 5 + 8 + \cdots + 41\).
(a) 298 (b) 301 (c) 279.5 (d) 304 (e) 43

15. Find the 6th term of the geometric sequence \(1, 3, 9, \ldots\)
(a) 27 (b) 81 (c) 243 (d) 729 (e) 18 (f) 24

16. Find the infinite sum \(8 + 4 + 2 + \cdots\).
(a) 1 (b) 4 (c) 12 (d) 8 (e) 16 (f) 24

17. In proving that
\[ \frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \cdots + \frac{1}{n(n+1)} = \frac{n}{n+1} \]
what term is added to the left hand side?
(a) \(\frac{n}{n+1}\) (b) \(\frac{1}{(n+1)(n+2)}\) (c) \(\frac{1}{n(n+1)}\) (d) \(n + 1\) (e) \(\frac{n+1}{n+2}\)

18. Given that \(A = \{1, 3, 5, 7, 9\}, B = \{1, 5, 6, 7\},\) and \(C = \{1, 2, 4, 6, 8, 9\}\) find \(A \cup B\).
(a) \{1, 3, 5, 7\} (b) \{1, 3, 5, 7, 9\} (c) \{1, 3, 5, 6, 7, 9\} (d) \{2, 4, 8\} (e) \{6, 9\}

19. Using the sets from the previous problem find \((A \cap C) \cup (B \cap C)\)
(a) \{1\} (b) \{1, 2, 6, 9\} (c) \{1, 5, 7, 9\} (d) \{1, 9\} (e) \{1, 6, 9\}

20. If \(n(A) = 15, n(B) = 20,\) and \(n(A \cap B) = 10\), find \(n(A \cup B)\).
(a) 1 (b) 5 (c) 10 (d) 15 (e) 25 (f) 35
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | B |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2 | B |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3 | B |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6 | D |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 7 | E |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 8 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 9 | A |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|10 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|11 | D |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|12 | E |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|13 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|14 | B |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|15 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|16 | E |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|17 | B |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|18 | C |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|19 | E |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|20 | E |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |