1. Find the focus, directrix, vertex and axis of the parabola \((y + 1)^2 = -8(x - 2)\). Sketch the graph.

2. An ellipse has foci at (1,0) and (1,2) and vertices at (0,1) and (2,1). Find the equation.

3. By completing the square, write the hyperbola \(9x^2 - 4y^2 + 54x + 16y + 101 = 0\) in standard form.
4. Solve the system of linear equations

\[
\begin{align*}
2x + 4y - 5z &= 4 \\
2x + 8y - 11z &= 5 \\
2x + 12y - 17z &= 6
\end{align*}
\]

5. Solve for \(x\):

\[
\begin{vmatrix}
2 & -1 & 1 \\
1 & x^2 & -3 \\
5 & 0 & 1
\end{vmatrix} = 4.
\]

6. Find the partial fraction decomposition of \(\frac{3x + 2}{x^2 - 1}\)
7. (a) Suppose that $a_0 = 1$, $a_1 = -2$, and $a_{n+1} = 2a_n - a_{n-1}$. Find $a_3$.

(b) If $\{b_n\}$ is an arithmetic sequence, and $b_0 = 4$, $b_3 = 16$, find the common difference.

(c) If $\{c_n\}$ is a geometric sequence, with $c_3 = 5$ and common ratio $r = 3$, what is the value of $c_1$?

8. Using the standard sums $\sum_{k=1}^{n} 1 = n$, $\sum_{k=1}^{n} k = \frac{1}{2}n(n+1)$ and $\sum_{k=1}^{n} k^2 = \frac{1}{6}n(n+1)(2n+1)$, evaluate $\sum_{k=1}^{1042} (3k^2 - 2k - 5)$. 

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9. Suppose that $a_0 = 0$ and $a_{n+1} = 3a_n + 2$. Prove, using induction, that $a_n = 3^n - 1$.

10. Find an expression for the coefficient of $x^0$ in the binomial expansion of $(4x^2 - \frac{3}{x^3})^{70}$. 

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