1. Write the equation of a polynomial function with the given characteristics. Use a leading coefficient of 1 or −1 and make the degree of the function as small as possible.

Crosses the x-axis at −4, 0, and 2; lies below the x-axis between −4 and 0; lies above the x-axis between 0 and 2.

☐ A. \( f(x) = x^3 + 2x^2 - 8x \)
☐ B. \( f(x) = -x^3 + 2x^2 + 8x \)
☐ C. \( f(x) = -x^3 - 2x^2 + 8x \)
☐ D. \( f(x) = x^3 - 2x^2 - 8x \)

2. Find the domain of the rational function.

\[ g(x) = \frac{x + 6}{x^2 + 1} \]

☐ A. \( \{x | x \neq -1, x \neq 1, x \neq -6\} \)
☐ B. all real numbers
☐ C. \( \{x | x \neq -1, x \neq 1\} \)
☐ D. \( \{x | x \neq 0, x \neq -1\} \)

3. Find the slant asymptote, if any, of the graph of the rational function.

\[ f(x) = \frac{x^3 + 2}{x^2 - 25} \]

☐ A. \( y = x - 25 \)
☐ B. \( y = x + 2 \)
☐ C. \( y = x \)
☐ D. no slant asymptote
4. Solve the rational inequality and graph the solution set on a real number line. Express the solution set in interval notation.

\[ \frac{2x}{x + 6} < x \]

○ A. \((-6, -4) \cup (0, \infty)\)  ○ B. \((-\infty, -6) \cup (0, \infty)\)

○ C. \((-\infty, -6) \cup (-4, 0)\)  ○ D. \((-\infty, 4) \cup (6, \infty)\)

5. Evaluate the expression without using a calculator.

\[ \log_{2} \frac{1}{\sqrt{7}} \]

○ A. \(-\frac{1}{2}\)  ○ B. \(\frac{1}{7}\)  ○ C. \(-\frac{1}{7}\)  ○ D. \(\frac{1}{2}\)

6. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

\[ 7 \log_{b} y + 3 \log_{b} z \]

○ A. \(\log_{b} (yz)^{10}\)  ○ B. \(\log_{b} y^{7}z^{3}\)  ○ C. \(21 \log_{b} yz\)  ○ D. \(10 \log_{b} yz\)
7. Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

\[ \ln(x - 7) - \ln(x + 10) = \ln(x - 1) - \ln(x + 1) \]

- **A.** \{ (\(-17/15\)) \}
- **B.** \(\emptyset\)
- **C.** \{(3/1)\}
- **D.** \{(3/15)\}
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