INSTRUCTIONS: Use your knowledge from algebra and precalculus to help solve the following problems. Show all steps in the solution.

1. Use rules about powers and roots to simplify the following so that there are no negative or fractional powers.
   (a) $3x^{-3/4}$
   (b) $\frac{4}{x^{-5/3}}$
   (c) $x^{2/7}$
   (d) $\frac{5}{x^{-7/3}}$
   (e) $\frac{x^{1/2}}{x^{-3/4}}$
   (f) $(4x)^{1/2}$
   (g) $\frac{\sqrt{x^2}}{\sqrt{x}}$
   (h) $\frac{\sqrt{36x^2}}{\sqrt{21x^6}}$

2. Use rules about exponentials and logarithms to simplify the following as much as possible.
   (a) $\ln(1)$
   (b) $e^0$
   (c) $e^{\ln 3}$
   (d) $\ln(\sqrt{e})$
   (e) $\ln\left(\frac{\sqrt{e^3}}{e}\right)$

3. Solve the following equations.
   (a) $x^2 + 6x - 40 = 0$
   (b) $3(x + 1) = x(x + 5) - 21$
   (c) $3x + 1 = 3^{2x}$
   (d) $3x + 1 = 92x$
   (e) $2x^2 + 2x + 1 = 4x^2 + x$
   (f) $8x^2 + 1 = 2^{6t}$

4. If $f(x) = 2x + 1$ and $g(x) = \sqrt{x}$, compute the following. Be sure to simplify as much as possible.
   (a) $f(g(x))$
   (b) $g(f(x))$
   (c) $f(g(4))$
   (d) $g(f(4))$

5. Find the $y = mx + b$ equation for the line that goes through the points (1, 3) and (4, 13).

6. If a line has slope $-3$ and y-intercept 7, what is its x-intercept?
7. Find the point of intersection of the lines \( y = 3x + 1 \) and \( y = 12x - 5 \).

8. Find where the curves \( f(x) = x^3 + 3x^2 - 4 \) and \( g(x) = 10x^2 - 12x - 4 \) intersect.

9. For the function \( f(x) = 2x^2 - 8x - 42 \), what is the \( y \)-intercept and what are the two \( x \)-intercepts?

10. Graph the triangle defined by the points \((-5, 2), (-2, -2), (6, 1)\). What are the lengths of each side? What are the midpoints of each side?