This quiz is designed to give you some practice in an exam-like setting before our second midterm a week from today.

1. Solve the equation. \( \left( \frac{1}{4} \right)^x = 16^{x+3} \)

2. Write the expression as a single logarithm. 
\[ \log(xy) + \frac{1}{3} \log(z) - 4 \log(y) \]

3. Solve the equation for \( x \).
\[ \log_3(10x) - \log_3(x + 3) = \log_3(2x - 1) \]
4. Let $f(x) = x^4 + 8x^3 + 12x^2$.
   (a) Factor $f(x)$ completely.

   (b) Find the roots of $f(x)$, and express them as ordered pairs.

   (c) For which $x$-values is $f(x) \geq 0$? For which $x$-values is $f(x) \leq 0$?

   (d) Graph the function $f(x)$. Label the axes and intercepts.

   (e) If $f(x)$ one-to-one? Support your answer.