1. Write the following as a single logarithm \( \log_4(x^2 - 1) - 5 \log_4(x + 1) \) and simplify.
\[
\log_4(x^2 - 1) - 5 \log_4(x + 1) = \log_4(x^2 - 1) - \log_4((x + 1)^5) = \log_4 \frac{x^2 - 1}{(x + 1)^5} = \log_4 \frac{x - 1}{(x + 1)^4}.
\]

2. What annual rate of interest compounded continuously is required to double an investment in 3 years.
\( A = Pe^{rt} \) is our equation and we have \( t = 3, A = 3P \) and are looking for \( r \). Setting up our equation we have \( 3P = Pe^{3r} \Rightarrow 3 = e^{3r} \Rightarrow \ln(3) = \ln(e^{3r}) \Rightarrow \ln(3) = 3r \Rightarrow r = \frac{\ln(3)}{3} \).

3. Evaluate \( \lim_{x \to -2} \frac{x}{x^2 + x} \).
\[
\lim_{x \to 0} \frac{x}{x^2 + x} = \lim_{x \to 0} \frac{x}{x(x + 1)} = \lim_{x \to 0} \frac{1}{x + 1} = 1.
\]

4. Answer the following questions about
\[
f(x) = \begin{cases} 
-1 & \text{if } x < -2 \\
1 & \text{if } -2 \leq x \leq 1 \\
x^2 + x & \text{if } x > 1 
\end{cases}
\]
1. \( \lim_{x \to -2^+} f(x) = -1 \)
2. \( \lim_{x \to -2^-} f(x) = -1 \)
3. \( \lim_{x \to -2} f(x) = -1 \)
4. \( f(-2) = -1 \)
5. \( \lim_{x \to 1^+} f(x) = 3 \)
6. \( \lim_{x \to 1^-} f(x) = 2 \)
7. \( \lim_{x \to 1} f(x) = \text{DNE} \)
8. \( f(1) = 2 \)
9. Is \( f \) continuous at \(-2\)? Yes
10. Is \( f \) continuous at \( 1 \)? No