CALCULATOR!

The half-life of Plutonium is 500 years. If we start with 2000 grams of Plutonium, how many years will it take to only have 300 grams remaining?

Find the amount needed to invest to end with a total balance of $5,000 in an account if the interest rate is 4% and interest is compounded monthly for 2 years.

How much money will be in an account after 3 years if interest is continuously compounded at 2.5% and you initially started with $15,000?
NO CALCULATOR!

Solve for x:

\[ 5^{x+2} = 125 \quad \Rightarrow \quad 2^4 = 64^x \]

Solve for x:

\[ \log_3(2x + 1) = 3 \quad \Rightarrow \quad \ln(x + 1) = 0 \]

Expand the logarithm as much as possible

\[ \log_2 \left( \frac{10x^2}{x + 1} \right) \]

Solve the following limits:

\[ \lim_{x \to 2} \frac{2x + 1}{4x} \]

\[ \lim_{x \to 3} \frac{8x^3 + 2x + 1}{7x^2 + 1} \]

\[ \lim_{x \to 11^+} \frac{x^2 + 2}{x - 11} \]

\[ \lim_{x \to \infty} \frac{4x^3 + 2x^2 + x}{2x^3 + 7x + 1} \]

\[ \lim_{x \to -\infty} \frac{3x^4 + 5x^2}{9x^3} \]
Find the average rate of change of the function \( f(x) = 6x^2 + 2x + 1 \) on \( x = 0 \) to \( x = 2 \).

Find the instantaneous rate of change of the function \( f(x) = 4\sqrt{x} \) at \( x = 9 \) and write the equation of the tangent line at this point.

Use the definition of a derivative to solve the following derivatives:
\[
f(x) = 7x^2 + 2 \text{ at } x = 1
\]
\[
f(x) = 3x^2 - 2x + 1 \text{ at } x = 2
\]