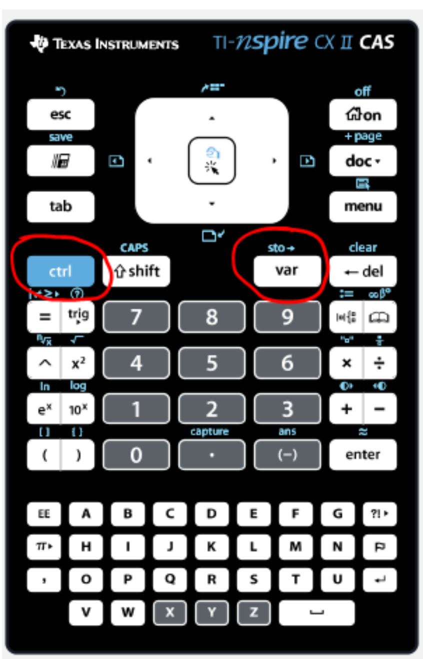
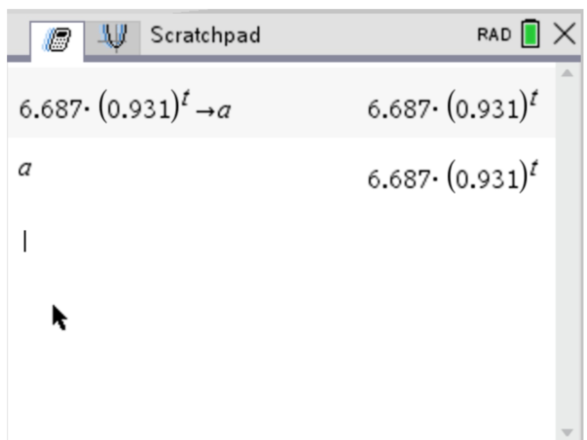
* It may benefit and save you time to store the function $A(t) = 6.687(0.931)^t$ in your calculator before starting this problem. You may (and will) use it several times.





A graphing calculator is required for these problems.

1. Grass clippings are placed in a bin, where they decompose. For $0 \le t \le 30$, the amount of grass clippings remaining in the bin is modeled by $A(t) = 6.687(0.931)^t$, where $A(t)$ is measured in pounds and t is measured in days.

   (a) Find the average rate of change of $A(t)$ over the interval $0 \le t \le 30$. Indicate units of measure.

The problem tells us to find the average rate of change of $A(t)$, which is the function given to us. Remember, AROC is simply found by $\dfrac{y_2 - y_1}{x_2 - x_1}$.

For this problem, we need to use

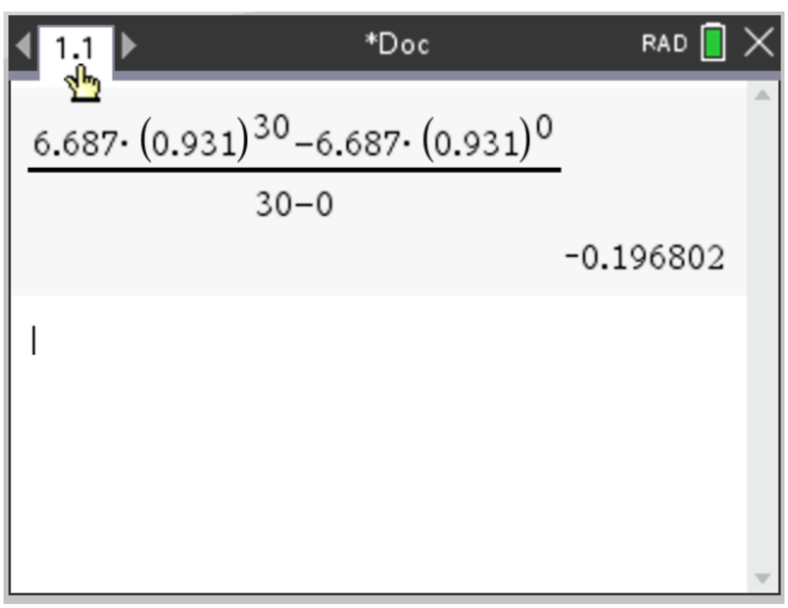
$$\frac{A(30) - A(0)}{30 - 0}.$$

$A(30) = 6.687(0.931)^{30} \approx 0.782928$

$A(0) = 6.687(0.931)^{0} = 6.687$

$$\frac{0.0782928 - 6.687}{30 - 0} \approx$$

Or



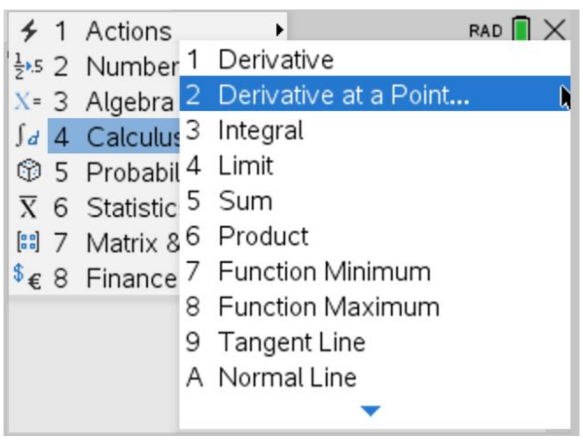
* Be careful with units. $A(t)$ is measured in pounds. $\therefore$ the rate of change for $A(t)$ is measured in pounds per day.

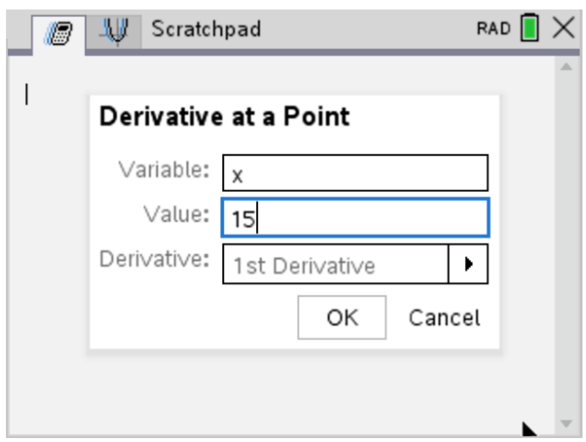
A graphing calculator is required for these problems.

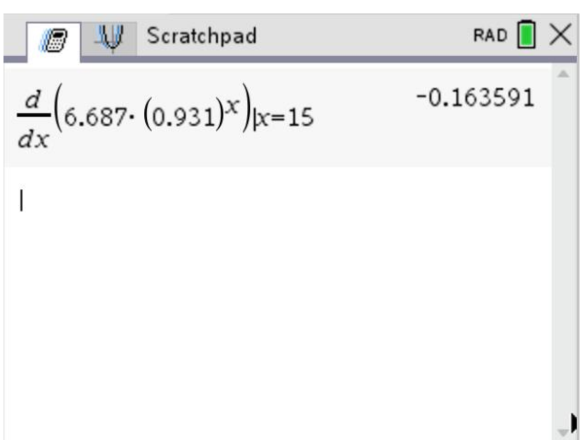
1. Grass clippings are placed in a bin, where they decompose. For $0 \le t \le 30$, the amount of grass clippings remaining in the bin is modeled by $A(t) = 6.687(0.931)^t$, where $A(t)$ is measured in pounds and t is measured in days.

   (b) Find the value of $A'(15)$. Using correct units, interpret the meaning of the value in the context of the problem.

A'(15) represents the instantaneous rate of change when t = 15 days. To find IROC at t = 15 days, we need to use our calculator to find the derivative of the function A(t) when t = 15.







Because the derivative is negative, this means the amount of grass clippings in the bin is decreasing at a rate of 0.164 pounds per day at t = 15 days.

A graphing calculator is required for these problems.

1. Grass clippings are placed in a bin, where they decompose. For $0 \le t \le 30$, the amount of grass clippings remaining in the bin is modeled by $A(t) = 6.687(0.931)^t$, where $A(t)$ is measured in pounds and t is measured in days.

   (c) Find the time t for which the amount of grass clippings in the bin is equal to the average amount of grass clippings in the bin over the interval $0 \le t \le 30$.

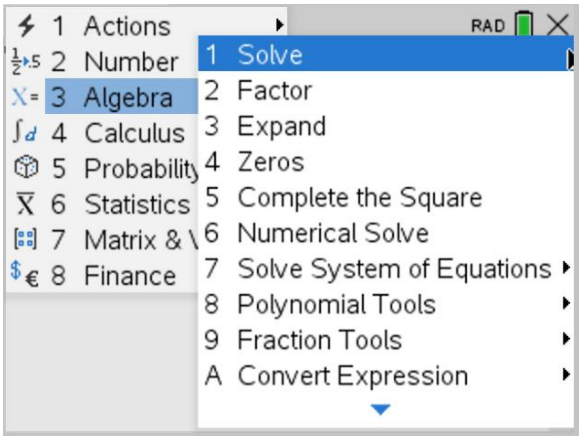
In this problem, we need to find the average amount of grass clippings in the bin and the function given to us, A(t), represents the amount of grass clippings in the bin.

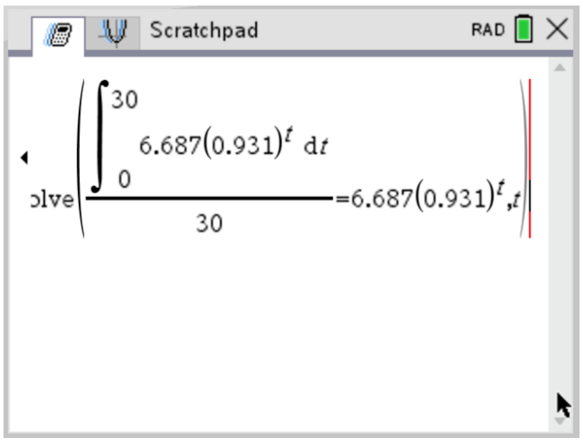
So, this problem is really asking us to find an average value, which is found by using $\frac{\text{Integral}}{\text{Interval}}$. $\frac{\int_0^{30} 6.687(0.931)^t \, dt}{30-0}$

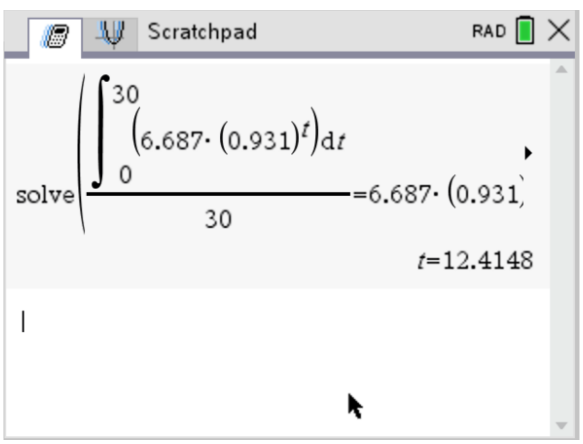
Now, this problem wants to know the time when the function is equal to the average value, so we need to set the average value equal to the function

$$\frac{\int_0^{30} 6.687(0.931)^t \, dt}{30-0} = 6.687(0.931)^t$$

We need to use our calculator to solve for t.


1 Actions
2 Number
3 Algebra
4 Calculus
5 Probability
6 Statistics
7 Matrix & V
8 Finance
RAD
1 Solve
2 Factor
3 Expand
4 Zeros
5 Complete the Square
6 Numerical Solve
7 Solve System of Equations
8 Polynomial Tools
9 Fraction Tools
A Convert Expression


Scratchpad
RAD
olve$\left(\frac{\int_0^{30} 6.687(0.931)^t\,dt}{30}=6.687(0.931)^t,t\right)$


Scratchpad
RAD
solve$\left(\frac{\int_0^{30} \left(6.687\cdot(0.931)^t\right)dt}{30}=6.687\cdot(0.931\right.$
$t=12.4148$

A graphing calculator is required for these problems.

1. Grass clippings are placed in a bin, where they decompose. For $0 \le t \le 30$, the amount of grass clippings remaining in the bin is modeled by $A(t) = 6.687(0.931)^t$, where $A(t)$ is measured in pounds and t is measured in days.

   (d) For $t > 30$, $L(t)$, the linear approximation to A at $t = 30$, is a better model for the amount of grass clippings remaining in the bin. Use $L(t)$ to predict the time at which there will be 0.5 pound of grass clippings remaining in the bin. Show the work that leads to your answer.

The phrase linear approximation to A at t=30 is a better way to state that L(t) is a straight line that touches A(t) at the one point where t=30. ∴ a linear approximation is also called a tangent line. Again, the 2 things needed for the equation of a tangent line are: 1. Point and 2. Slope (Derivative).

$L(30) = A(30)$

$L'(30) = A'(30)$

Since we know A(t), but not L(t), we need to use A(30) as our y_1-value and A'(30) as our slope. Obviously, 30 is our x_1-value.

$$y - y_1 = m(x - x_1)$$

↓

$$y - A(30) = A'(30) \cdot (x - 30)$$

$$\downarrow$$

$$y = A'(30) \cdot (x - 30) + A(30)$$

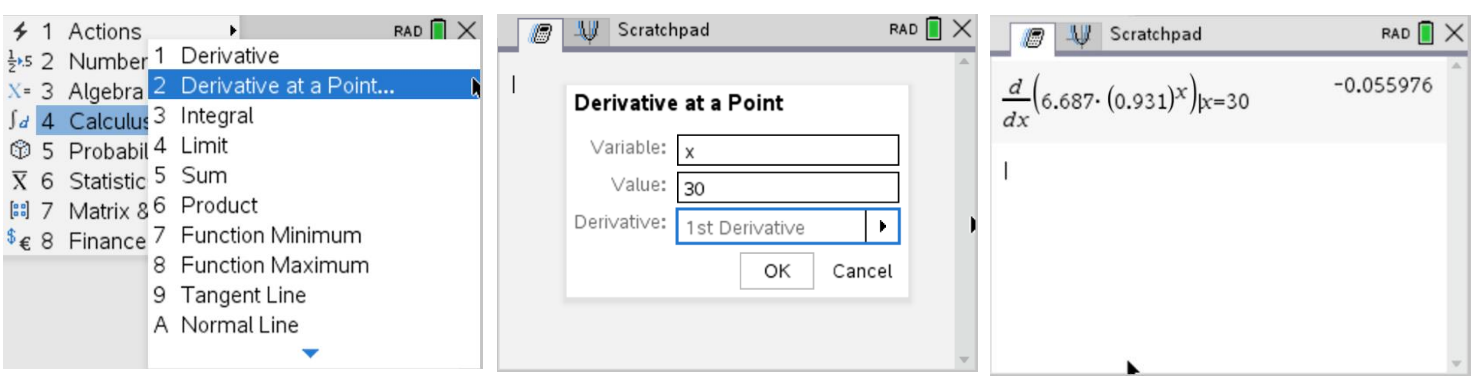
$$\downarrow$$

Use $L(t)$ and t instead of y and x.

$$L(t) = A'(30) \cdot (t - 30) + A(30)$$

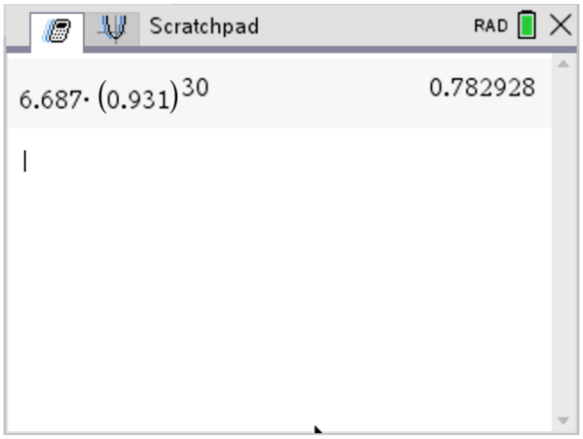
The problem wants us to determine the time, t, where $L(t) = 0.5$; we need to use our calculator to solve for t.

$$0.5 = A'(30) \cdot (t - 30) + A(30)$$



$$A'(30) \approx -0.055976$$

$$\downarrow$$



$$A(30) \approx 0.782928$$