Instructions

- Read today's Notes and Learning Goals
- Numerical questions in this assignment will allow up to 100 submissions.
- Multiple Choice and Matching questions will be much more limited.
A population of rabbits is described by the function \( R(t) = 100(2^{t/5}) \), where \( t \) is measured in months and \( R \) is measured in rabbits. Create a clear and properly labeled graph of \( R(t) \) on the domain \( 0 \leq t \leq 15 \) months. Proper labeling includes at least:

- A name on the input axis. This can be a variable or a word.
- Units on the input axis.
- Tickmarks on the input axis, with enough of them numbered so that scale is apparent.
- All of the above on the output axis.

After your graph is complete:

1. Find \( R(0) \) and select the correct units from
   - rabbits
   - months
   - no units
   - rabbits/month

2. Find \( R(10) \) and select the correct units from
   - no units
   - rabbits/month
   - rabbits
   - months

3. When will the population be 500 rabbits? Your answer must be accurate to one decimal place.  
   Then select the correct units from
4. If $R(t) = 300$ what is $t$? Your answer must be accurate to three decimal places. 

Then select the correct units from
- rabbits/month
- no units
- rabbits
- months

5. Find the change in $R$ on the interval $0 \leq t \leq 10$ months and select the correct units from
- no units
- months
- rabbits/month
- rabbits

6. Find $\Delta R$ on $[1.2]$. Round your answer to the nearest whole number and select the correct units from
- months
- no units
- rabbits
- rabbits/month

7. Find the average rate of change of $R$ on the interval $5 \leq t \leq 7$ months. Your answer must be accurate to two decimal places.

Select the correct units from
- rabbits/month
- no units
- rabbits
- months

Then, in your original graph of $R(t)$, sketch a secant line that corresponds to this rate of change.

8. Find $\frac{\Delta R}{\Delta t}$ on $[2.5]$. Your answer must be accurate to one decimal place.

Select the correct units from
- months
- rabbits
- rabbits/month
- no units

Then, in your original graph of $R(t)$, sketch the corresponding secant line.
2. Question Details

The electric potential in a circuit is given by \( V(t) = 320e^{-3.1t} \), where \( t \) is measured in seconds and \( V \) is measured in volts. Use your own paper (graph paper recommended, but not required) to create a clear and properly labeled graph of \( V(t) \) on the domain \( 0 \leq t \leq 3 \) seconds. After your graph is complete:

1. Find \( \Delta V \) on \([0,1]\). Round your answer to the nearest volt and include units. 
   
   (Go here for rules on how to include units when you type your answer. You will also find allowable abbreviations for many units.)

2. Find \( \frac{\Delta V}{\Delta t} \) on \([0,0.5]\). Round your answer to the nearest whole number and include units. Sketch the corresponding secant line in your original graph of \( V(t) \).

3. Find \( \frac{\Delta V}{\Delta t} \) on \([0.5,0.6]\). Round your answer to the nearest whole number and include units. Sketch the corresponding secant line in your original graph of \( V(t) \).

4. When is the potential exactly 150 volts? Round your answer to three decimal places and use correct units.

NOTE: At the conclusion of this problem you should have a good graph of \( V(t) \) that includes two secant lines. Save this graph. You may be asked to turn it in later.

3. Question Details

The position of a moving object is given by \( s(t) = 2.1\sin(\pi(t-0.2)) \), where \( t \) is measured in minutes and \( s \) is measured in feet. Use your own paper (graph paper recommended, but not required) to create a clear and properly labeled graph of \( s(t) \) on the domain \( 0 \leq t \leq 4 \) minutes. After your graph is complete:

1. Find \( s(2.0) \) with and correct units and two decimal places of accuracy. 
   
   NOTE: Set your calculator to radians. Plan on leaving it that way for the rest of the semester.

2. How many times in the domain \( 0 \leq t \leq 4 \) does \( s(t) = 0.5 \) ft? 

3. What is the first time in the domain \( 0 \leq t \leq 4 \) when \( s(t) = 0.5 \) ft? Use correct units three decimal places of accuracy. 

4. What is the last time in the domain \( 0 \leq t \leq 4 \) when \( s(t) = 0.5 \) ft? Use correct units and two decimal places of accuracy. 

5. Find \( \frac{\Delta s}{\Delta t} \) on each of the intervals listed below. All answers must have two decimal places of accuracy and correct units. Sketch the corresponding secant lines in your original graph of \( s(t) \).

\[
\begin{align*}
[1.8,2.0] & \\
[1.9,2.0] & \\
[2.0,2.1] & 
\end{align*}
\]

NOTE: At the conclusion of this problem you should have a good graph of \( s(t) \) that includes three secant lines. Save this graph. You may be asked to turn it in later.
The table below gives the height, \( h \), of a falling object (in feet) at various times, \( t \) (in seconds).

<table>
<thead>
<tr>
<th>( t ) (s)</th>
<th>0.00</th>
<th>0.25</th>
<th>0.50</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>1.75</th>
<th>2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>( h ) (ft)</td>
<td>100</td>
<td>99</td>
<td>96</td>
<td>91</td>
<td>84</td>
<td>75</td>
<td>64</td>
<td>51</td>
<td>36</td>
</tr>
</tbody>
</table>

Create a clear and properly labeled graph of \( \frac{d}{dt}h(t) \) on the domain \( 0 \leq t \leq 2 \) seconds.

After your graph is complete:

1. Find \( h(1.0) \)
2. Estimate \( h(1.2) \) to the nearest foot
3. When is \( h(t) = 51 \) ft? Be accurate to two decimal places.
4. Estimate when \( h(t) = 40 \) ft. Be accurate to one decimal place.
5. Find the average velocity of the object on each of the intervals listed below. All answers must be accurate to one decimal place. Sketch corresponding secant lines.

\[
\begin{align*}
[0.50, 1.00] \\
[0.75, 1.00] \\
[1.00, 1.25] \\
[1.00, 1.50] \\
\end{align*}
\]
NOTE: This is your first matching question. You should select an option from each pull down menu before you click "submit". You only get 10 submissions on this problem.

The figure below shows a function, \( f(x) \), and four secant lines labeled A, B, C and D. Each secant line corresponds to an average rate of change. Match the letters to the appropriate rate of change below. Put the letter E on the rate of change that does not correspond to any of the secant lines.

\[
\frac{\Delta f}{\Delta x} \text{ on } [1,2] \\
\frac{\Delta f}{\Delta x} \text{ on } [2,3] \\
\frac{\Delta f}{\Delta x} \text{ on } [2,3.6] \\
\frac{\Delta f}{\Delta x} \text{ on } [2,2.4] \\
\text{Average rate of change of } f(x) \text{ on } [0.4,2]
\]