1. **Question Details**

An object is thrown straight up. Its height is given by

\[ y(t) = 100t - 16t^2 \]

with \( y \) in feet and \( t \) in seconds. Write a formula for the average velocity on the interval \([1.7, x]\). Enter your answer as an algebraic expression. Any decimals must be exact. You do not have to simplify.

\[ \frac{\Delta y}{\Delta t} = \]

2. **Question Details**

As in the previous problem, the height of an object thrown straight up is given by

\[ y(t) = 100t - 16t^2 \]

with \( y \) in feet and \( t \) in seconds. Compute the average velocity on each of the intervals in the table below. Answers should be accurate to two decimal places.

HINT! The best way to do this is to plug the numbers \( x = 1.68, 1.69, 1.71, \) and \( 1.72 \) into your secant slope formula from the previous problem. It's even better if you type your formula into a calculator or a spreadsheet.

<table>
<thead>
<tr>
<th>Interval</th>
<th>( \frac{\Delta y}{\Delta t} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1.68, 1.70]</td>
<td></td>
</tr>
<tr>
<td>[1.69, 1.70]</td>
<td></td>
</tr>
<tr>
<td>[1.70, 1.70]</td>
<td>Undefined</td>
</tr>
<tr>
<td>[1.70, 1.71]</td>
<td></td>
</tr>
<tr>
<td>[1.70, 1.72]</td>
<td></td>
</tr>
</tbody>
</table>

3. **Question Details**

As in the previous problem, the height of an object is given by

\[ y(t) = 100t - 16t^2 \]

with \( y \) in feet and \( t \) in seconds. Compute the velocity **at the instant** when \( t = 1.70 \) seconds. Your answer must be accurate to one decimal place.

**NOTE:** The most efficient solution would be to plug \( x = 1.70 \) into your secant slope formula. However, it is unlikely that your formula will allow this. If you can figure out how to resolve this problem, good for you! Otherwise, just use your table of secant slopes to estimate the tangent slope.

\[ \frac{dy}{dt} \bigg|_{t=1.7} = \]
4. **Question Details**

The height of a falling object (subject to air resistance) is given by

\[ h(t) = 400 - 39t - 157e^{-t/4} \]

with \( h \) in meters and \( t \) in seconds. Write a formula for the average velocity on the interval \([2, a]\). Enter your answer as an algebraic expression. You do not have to simplify.

\[ \frac{\Delta h}{\Delta t} = \]

5. **Question Details**

As in the previous problem, the height of a falling object is given by

\[ h(t) = 400 - 39t - 157e^{-t/4} \]

with \( h \) in meters and \( t \) in seconds. Compute the average velocity on each of the intervals in the table below. Answers should be accurate to two decimal places.

HINT! The best way to do this is to plug numbers into your secant slope formula from the previous problem. It’s even better if you type your formula into a calculator or a spreadsheet.

<table>
<thead>
<tr>
<th>Interval</th>
<th>( \Delta h/\Delta t )</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1.8, 2.0]</td>
<td></td>
</tr>
<tr>
<td>[1.9, 2.0]</td>
<td></td>
</tr>
<tr>
<td>[2.0, 2.0]</td>
<td>Undefined</td>
</tr>
<tr>
<td>[2.0, 2.1]</td>
<td></td>
</tr>
<tr>
<td>[2.0, 2.2]</td>
<td></td>
</tr>
</tbody>
</table>

6. **Question Details**

As in the previous problem, the height of a falling object is given by

\[ h(t) = 400 - 39t - 157e^{-t/4} \]

with \( h \) in meters and \( t \) in seconds. Compute the velocity at the instant when \( t = 2.0 \) seconds. Your answer must be accurate to one decimal place.

NOTE: The best way to do this is to plug \( a = 2 \) into your secant slope formula. Too bad that’s impossible. You will have to use your table of secant slopes to estimate the answer.

\[ \frac{dh}{dt} \bigg|_{t=2.0} = \]

7. **Question Details**

The potential in an electric circuit oscillates according to

\[ V(t) = -5 \sin(3t) \]

with \( V \) in volts and \( t \) in seconds. Write a formula for the average rate of change of \( V \) on the interval \([1, u]\). Enter your answer as an algebraic expression. You do not have to simplify.

\[ \frac{\Delta V}{\Delta t} = \]
8. Question Details

As in the previous problem, electric potential in a circuit is given by

\[ V(t) = -5 \sin(3t) \]

with \( V \) in volts and \( t \) in seconds. Compute the average rate of change of \( V \) on each of the intervals in the table below. Answers should be accurate to two decimal places.

HINT! The best way to do this is to plug numbers into your secant slope formula from the previous problem. It’s even better if you type your formula into a calculator or a spreadsheet.

<table>
<thead>
<tr>
<th>Interval</th>
<th>( \frac{\Delta V}{\Delta t} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0.98, 1]</td>
<td></td>
</tr>
<tr>
<td>[0.99, 1]</td>
<td></td>
</tr>
<tr>
<td>[1, 1]</td>
<td>Undefined</td>
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<tr>
<td>[1, 1.01]</td>
<td></td>
</tr>
<tr>
<td>[1, 1.02]</td>
<td></td>
</tr>
</tbody>
</table>

9. Question Details

As in the previous problem, electric potential in a circuit is given by

\[ V(t) = -5 \sin(3t) \]

with \( V \) in volts and \( t \) in seconds. Compute the rate of change of \( V \) at the instant \( t = 1 \) second. Your answer must be accurate to one decimal place.

NOTE: The best way to do this is to plug \( u = 1 \) into your secant slope formula. Too bad that’s impossible. You will have to use your table of secant slopes to estimate the answer.

\[ V'(1) = \]
11. Question Details

As in the previous problem, the height of an object thrown straight up is given by

\[ y(t) = 100t - 16t^2 \]

with \( y \) in feet and \( t \) in seconds. Compute the average velocity on each of the intervals in the table below. Answers should be accurate to two decimal places.

HINT! The best way to do this is to plug the numbers \( h = -0.02, -0.01, 0.01, \) and \( 0.02 \) into your secant slope formula from the previous problem. It's even better if you type your formula into a calculator or a spreadsheet.

<table>
<thead>
<tr>
<th>( h )</th>
<th>Interval</th>
<th>( \frac{\Delta y}{\Delta t} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.02</td>
<td>[1.98, 2]</td>
<td></td>
</tr>
<tr>
<td>-0.01</td>
<td>[1.99, 2]</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>[2, 2]</td>
<td>Undefined</td>
</tr>
<tr>
<td>0.01</td>
<td>[2, 2.01]</td>
<td></td>
</tr>
<tr>
<td>0.02</td>
<td>[2, 2.02]</td>
<td></td>
</tr>
</tbody>
</table>

12. Question Details

As in the previous problem, the height of an object is given by

\[ y(t) = 100t - 16t^2 \]

with \( y \) in feet and \( t \) in seconds. Compute the velocity at the instant when \( t = 2 \) seconds. Your answer must be accurate to one decimal place.

NOTE: The most efficient solution would be to plug \( h = 0 \) into your secant slope formula. However, it is unlikely that your formula will allow this. If you can figure out how to resolve this problem, good for you! Otherwise, just use your table of secant slopes to estimate the tangent slope.

\[ y'(2) = \]

13. Question Details

Water is draining out of a tank. The volume of water remaining in the tank is a function of time:

\[ V(t) = 10 - 3\sqrt{t} \]

with \( V \) in gallons and \( t \) in minutes. Write a formula for the average rate of change of \( V \) on the interval \([5, 5 + h]\). Enter your answer as an algebraic expression. You do not have to simplify.

\[ \frac{\Delta V}{\Delta t} = \]
As in the previous problem, the volume of water remaining in the tank is

\[ V(t) = 10 - 3\sqrt{t} \]

with \( V \) in gallons \( t \) in minutes. Compute the flow rate at the instant \( t = 5 \) minutes. Your answer must be accurate to two decimal places.

NOTE: The most efficient solution would be to plug \( h = 0 \) into your secant slope formula. However, it is unlikely that your formula will allow this. If you can figure out how to resolve this problem, good for you! Otherwise, you will have to build an appropriate table of secant slopes and use it to estimate the answer.

\[ V'(5) = \]