Name: _____ _____ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [11 points] Let $P(2,2)$ be a point on the graph of $f(x) = \dfrac{6-x}{x}$.

a. Find the slope of the secant line passing through P and the point $Q(1, f(1))$.

b. Find the slope of the secant line passing through P and the point $Q(3, f(3))$.

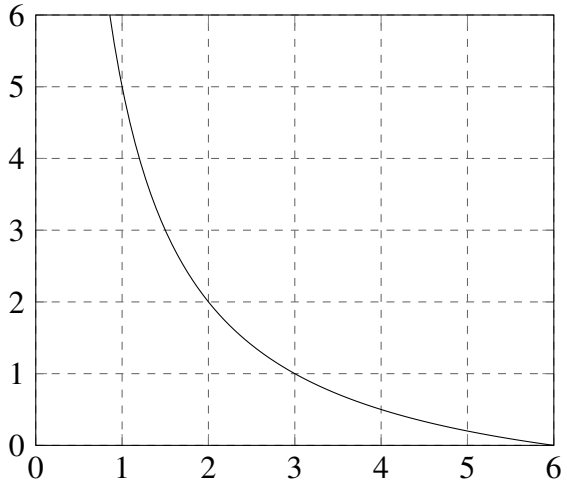
c. The table below lists the slope of the secant line passing through the point P and the point $Q(x, f(x))$ for several values of x.

x	1.9	1.99	1.999	2.001	2.01	2.1
f(x)	2.157895	2.015075	2.001501	1.998501	1.985075	1.857143
m_{sec}	-1.57895	-1.50754	-1.50075	-1.49925	-1.49254	-1.42857

Use the information in the table to estimate the slope of the tangent line to $f(x)$ at the point $P(2,2)$.

d. Use the slope from part (c) above to write an equation of the tangent line at point $P(2,2)$.

e. Below is a sketch of the graph of $f(x) = \frac{6-x}{x}$. Sketch the tangent line to the graph at the point $P(2,2)$.



2. [14 points] A spring is stretched out and released. Its length in inches at time t seconds is given by the function:

$$L(t) = 4\cos(\pi t) + 6$$

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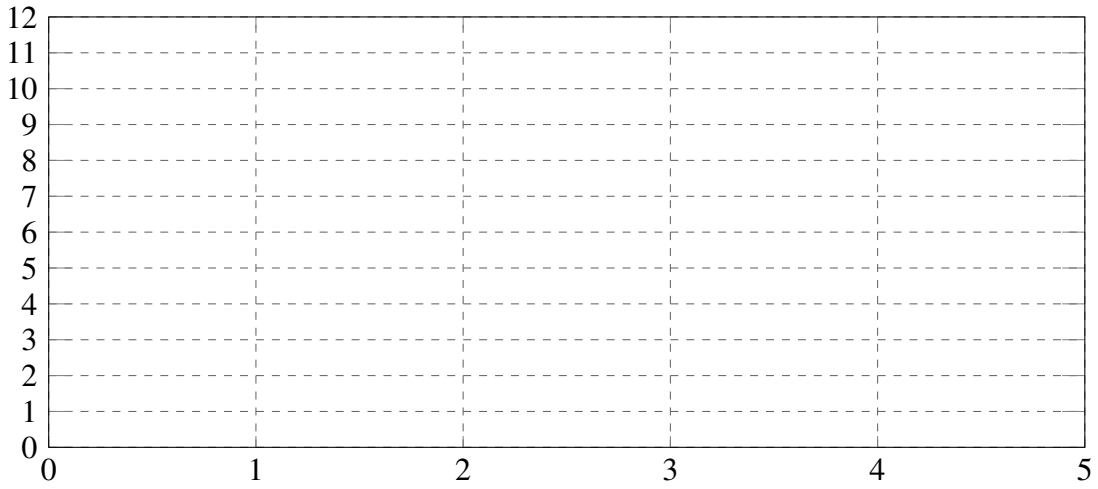
a. Sketch a graph of $L(t)$ below. (Hint: Find $L(0), L(1), L(2), L(3)$, and $L(4)$.)



b. Calculate the length of the spring at $t = \dfrac{1}{3}$ seconds and $t = \dfrac{2}{3}$ seconds. Include units in your final answer.

$L\left(\frac{1}{3}\right) =$

$L\left(\frac{2}{3}\right) =$

c. Calculate the **average rate of change** of the length of the spring from $t = \dfrac{1}{3}$ seconds to $t = \dfrac{2}{3}$ seconds. Show your work and include units in your final answer.

d. Based on your graph in part (a) from above, estimate the **instantanous rate of change** of the length of the spring at $t = 2$ seconds. Unclude units in your final answer.