

What are you called on average? Ken Period: \_\_\_\_\_

AP Calculus AB: 3.1 Average Rate of Change

1. Using the function  $f(x) = x^3 + x$

a) Find the slope of the secant line from  $x=-1$  to  $x=2$

$$\frac{f(2) - f(-1)}{2 - (-1)} = 4$$

b) Estimate the instantaneous rate of change at  $x=3$

$$\frac{f(3.1) - f(3)}{3.1 - 3} = 28.91$$

2. Using the function  $f(x) = \frac{3x}{x+2}$

a) Find the slope of the secant line from  $x=0$  to  $x=6$

$$\frac{3}{8}$$

b) Estimate the instantaneous rate of change at  $x=2$

$$.37$$

3. A man was upset with the taste of his redbull and decided to throw it off a cliff. If the position of the redbull, as it falls towards the ground, is given by the function  $s(t) = -4.9t^2 + 25$  where  $s(t)$  is measured in meters and time in seconds.

a) Calculate the average speed of the redbull between the times  $t=1$  and  $t=2$ . (Give correct units)

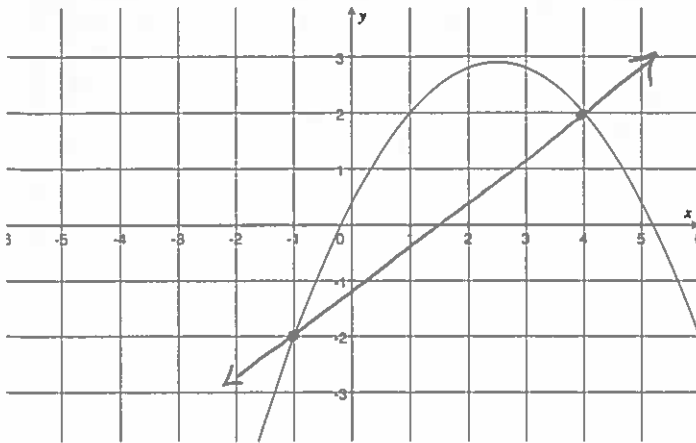
$$-14.7 \text{ m/s}$$

b) Estimate the instantaneous rate of change of the can at  $t=1.5$  seconds. (Give correct units)

$$\frac{s(1.6) - s(1.5)}{1.6 - 1.5} = \frac{\cancel{15.9}}{0.1} = \boxed{-15.9 \text{ m/s}}$$

What are you called on average? \_\_\_\_\_ Period: \_\_\_\_\_

4. Using the graph below calculate the average rate of change from  $x=-1$  to  $x=4$ . Also, draw the secant line you are finding the slope of.



$$\frac{f(4) - f(-1)}{4 - (-1)} = \boxed{\frac{4}{5}}$$

5. The table below represents a velocity-time graph of a car driving over several hours.

Hours(t)	3	5	7	9	11	13
Km/hr (v)	25	31	33	41	45	40

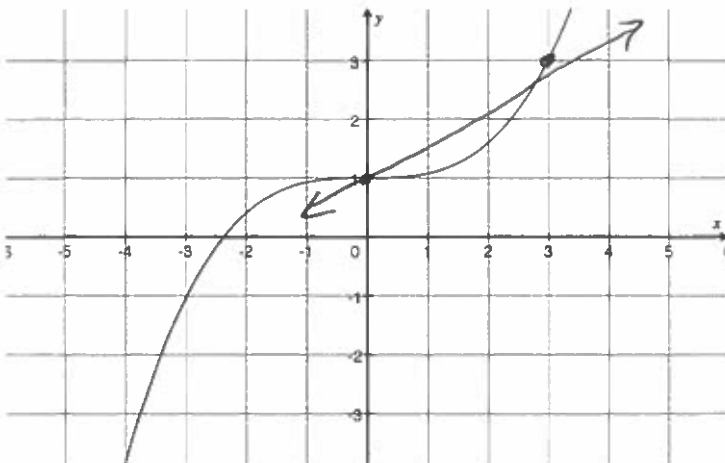
a) Use the table below to calculate the average acceleration of the car from time  $t=5$  to  $t=11$ . (Give correct units)

$$\frac{7}{3} \frac{\text{km}}{\text{hr}^2}$$

b) What's the closest approximation you can give me for the instantaneous rate of change of the car at  $t=8$ ?

$$\frac{v(9) - v(7)}{9 - 7} = \frac{8}{2} = \boxed{4 \text{ km/hr}^2}$$

6. The graph below represents the ticket sales for a rock concert. The y-axis is number of tickets sold and the x-axis is the time in hours. At what average rate were the tickets being sold from the time interval  $0 \leq t \leq 3$ . (Give correct units)



$$\frac{f(3) - f(0)}{3 - 0} = \frac{2}{3}$$

$$\boxed{\frac{2}{3} \frac{\text{tickets}}{\text{hr}}}$$