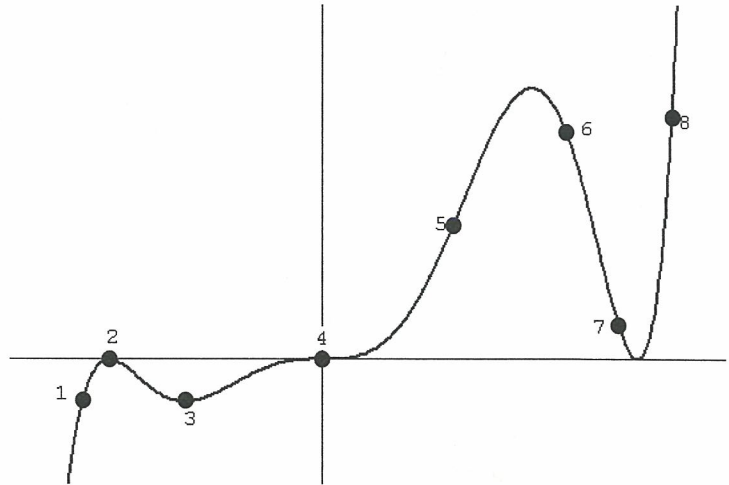


Name _____

quiz PRACTICE Meaning of Derivatives

1) Given the function $f(x)$ below indicate if $f(x)$, $f'(x)$, and $f''(x)$ are positive, negative or zero at each point.

Point	$f(x)$	$f'(x)$	$f''(x)$
1	-	+	-
2	0	0	-
3	-	0	+
4	0	0	0
5	+	+	0
6	+	-	-
7	+	-	+
8	+	+	+



2) Mr. Haas eats his "Math Cereal" each morning and notices that there is a relationship between the temperature of the milk he puts on the cereal and the time for the cereal to get soggy. The time to get soggy (in minutes) is a function of the milk temperature (in Degrees Celsius).

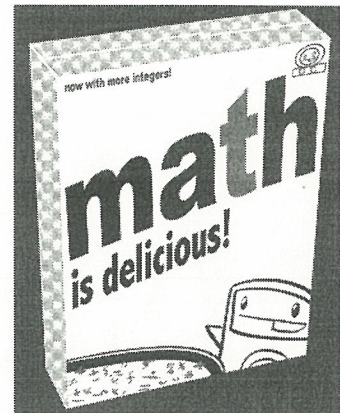
Explain the meaning of the following.
(Include Units!!!)

a) $f(4)=5$

at 4°C the cereal gets soggy in 5 minutes.

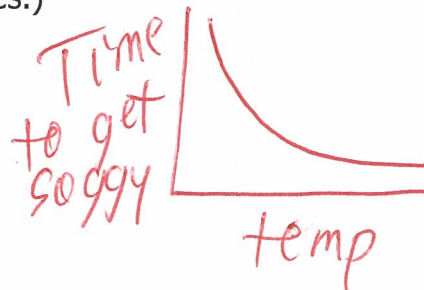
b) $f'(4)=-0.5$

at 4°C the time to get soggy is decreasing by 0.5 min per $^{\circ}\text{C}$



c) Mr. Haas finds that warmer milk temperatures make the cereal soggy faster. However, the amount of time it takes to get soggy decreases at a slower rate as the milk gets warmer. (That is - an increase in milk temperature has a greater effect on the time to get soggy at lower temperatures than at higher temperatures.)

Sketch a graph of this relationship.



What must be true about the sign of $f''(x)$?

+ (concave Up)

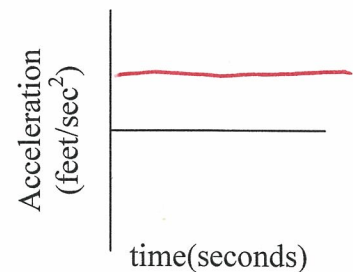
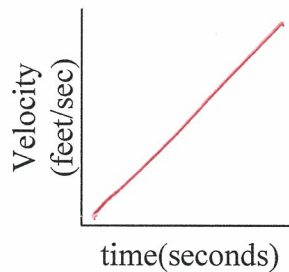
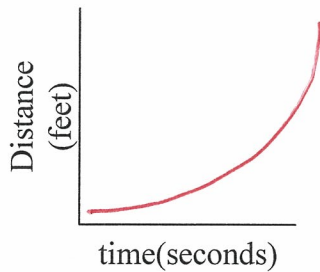
3) The acceleration of a Ferrari F430 is tested on a track.

Time (seconds)	Total Distance (feet)
0.0	0
1.0	12
2.0	48
3.0	108

The total distance (in feet) traveled by the Ferrari was recorded each second for a 3 second interval.



a) Make a rough sketch (do NOT plot the exact points) of time vs. distance, velocity, and acceleration graphs below. You MUST label the axis.



b) Determine the acceleration of the car as a function of time.

$$24 \text{ ft/sec}^2$$

4) For equally high quality diamonds the **cost** (in thousands of dollars) is a function of **weight** (in carats). $c=f(w)$.

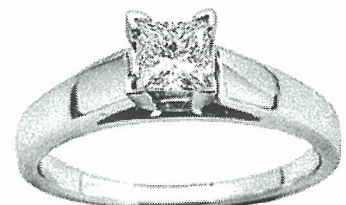
a) A 2 carat costs \$6,000 is best expressed as:

(1) $f(6)=2$ (2) $f(2)=6$ (3) $f'(2)=6$ (4) $f'(6)=2$

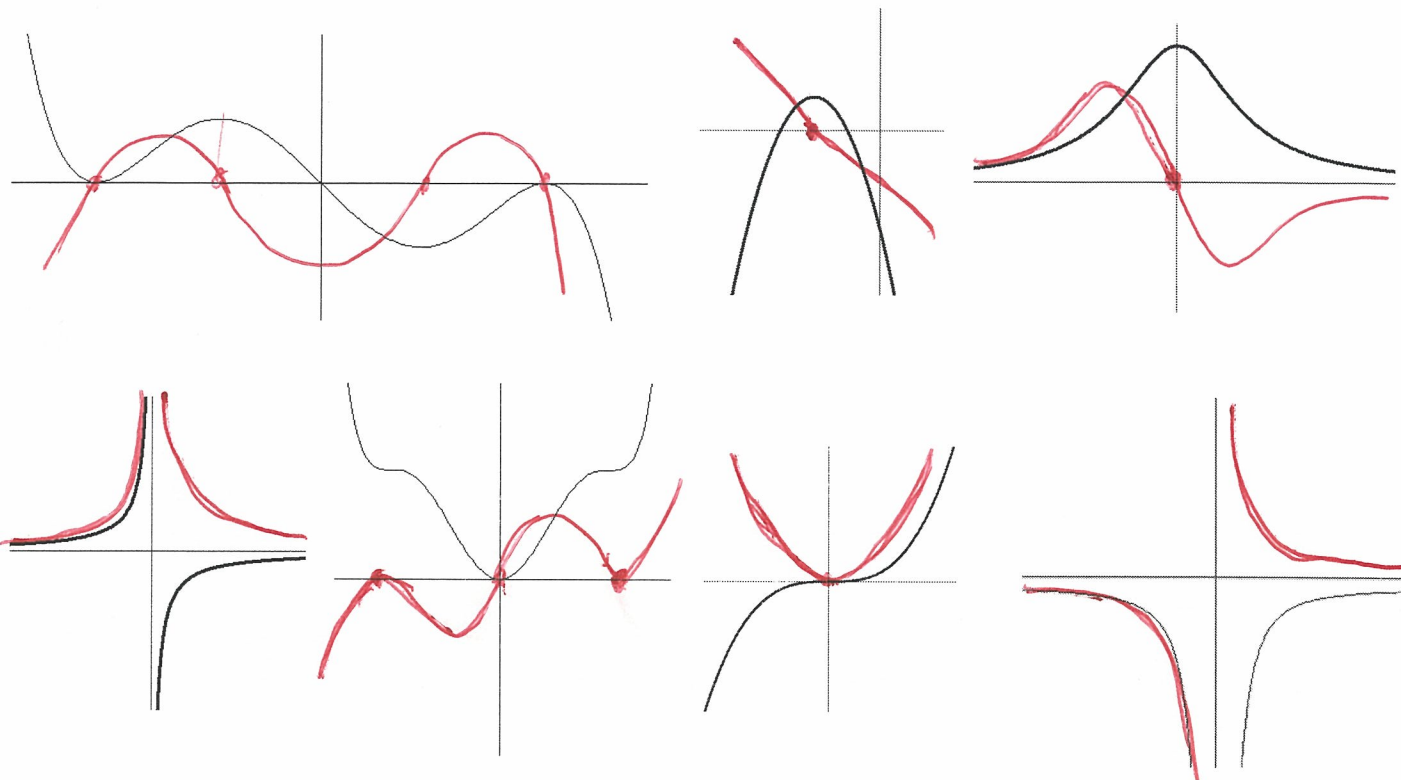
b) Since large diamonds are more rare, the larger a diamond is the greater the cost per carat. Which of the following must be true?

(1) $f'(x)>0$ (2) $f'(x)<0$ (3) $f'(x)=0$

(4) $f''(x)>0$ (5) $f''(x)<0$ (6) $f''(x)=0$



5) Sketch the first derivatives of the functions below.



6) Sketch a function given the following information about its first and second derivative.

$f'(x) < 0$ for all x in the domain

$f''(x) > 0$ for $x < 0$

$f''(x) < 0$ for $x > 0$

$f'(x) > 0$ for $x < 0$

$f'(x) < 0$ for $x > 0$

$f''(x) < 0$ for all x in the domain

