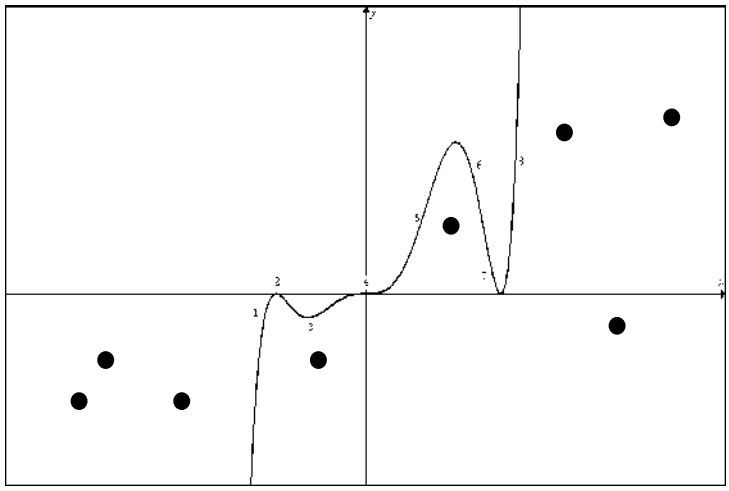
Name_____ **quiz PRACTICE Meaning of Derivatives**

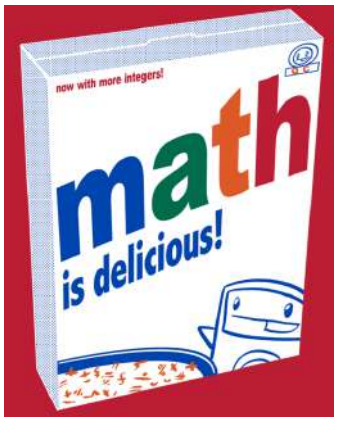
1) Given the function f(x) below indicate if f(x), f′(x), and f″(x) are positive, negative or zero at each point.

Point	f(x)	f′(x)	f″(x)
1			
2			
3			
4			
5			
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

b) f′(4)=-0.5

c) Mr. Haas finds that warmer milk temperatures make the cereal soggier faster. However, the amount of time it takes to get soggy decreases less 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.

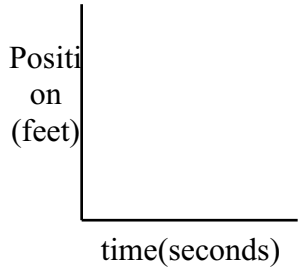
What must be true about the sign of f″(x)?

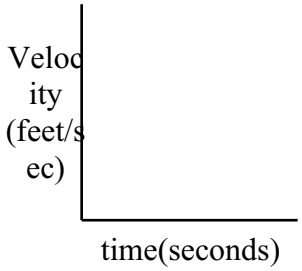
3) The acceleration of a Ferrari F430 is tested on a track.

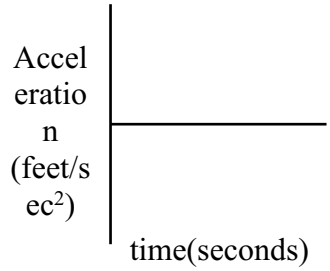
Time (seconds)	Position (feet)
0.0	0
1.0	12
2.0	48
3.0	108

The position (in feet) of 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.

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:

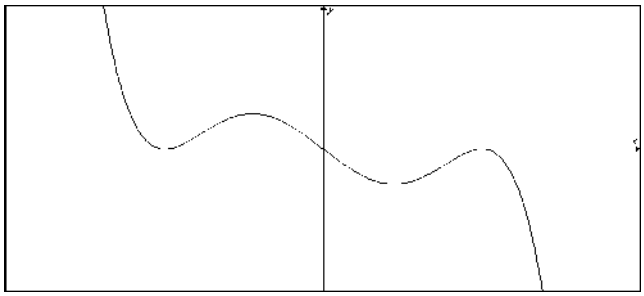
(1) f(6)=2 (2) f(2)=6 (3) f′(2)=6 (4) f′(6)=2

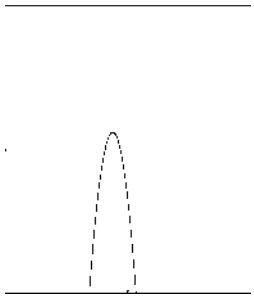
b) Since large diamonds are more rare, the larger a diamond is the greater the cost per carat. Which of the following must be true?

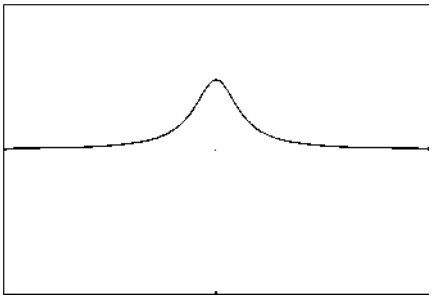
(1) f′(x)>0 (2) f′(x)<0 (3) f′(x)=0

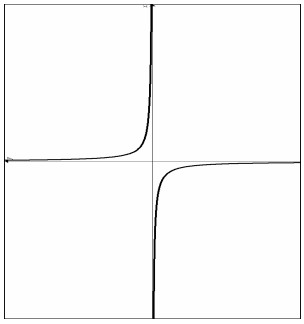
(4) f″(x)>0 (5) f″(x)<0 (6) f″(x)=0

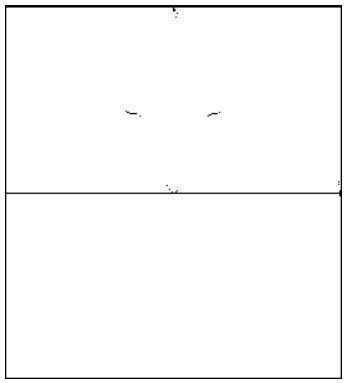
5) Sketch the first derivatives of the functions below.

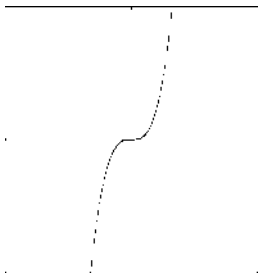


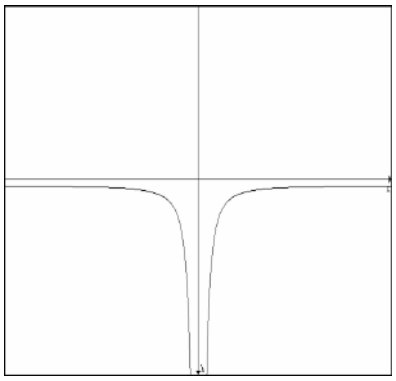












6) Sketch a function given the following information about its first and second derivative.

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

second derivative meaning practice II

1) As Sponge Bob SquarePants swims to the bottom of a swimming pool, there is an increase in pressure caused by the weight of the water above. Pressure, measured in pounds per square inch, is a function of depth in feet p=f(d). Your ears are particularly sensitive to this pressure change; that's why they hurt!

Explain the meaning of:

a) f(0) = 15

b) f(10) = 20

Assume f'(x) is the same for all x. Determine its value. (Include units)

What must be the value of f''(x)? (+,-, or 0) _____

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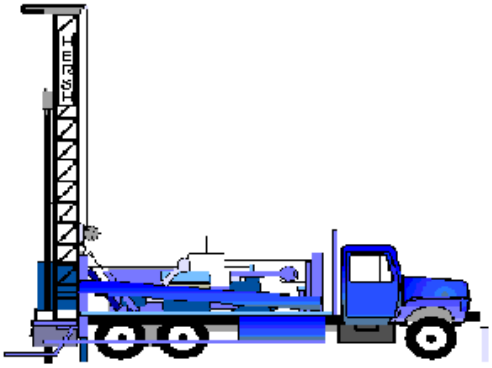
2) The cost **'c'** of drilling a well in dollars is a function of depth in feet **'d'**.

Explain the meaning of the following: **(Include units!!!)**

(a) f(85)=900

(b) f'(75)=15

(c) f''(x)=0.10 for all x.



Sketch f(x), f'(x), and f''(x) below: