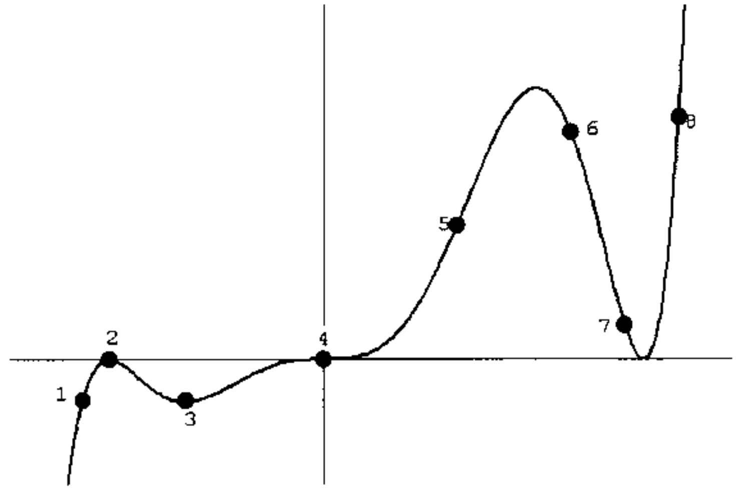
Name Answers **quiz PRACTICE Meaning of Derivatives2020**

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

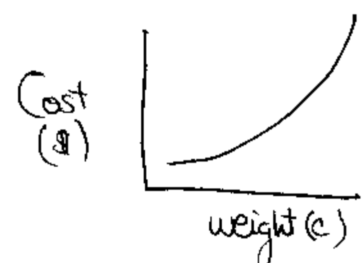
a) A 2 carat costs $6,000 is best expressed as:

(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



3) Use the limit definition of the derivative to find the derivative of $f(x) = -x^3 - 5x + 1$

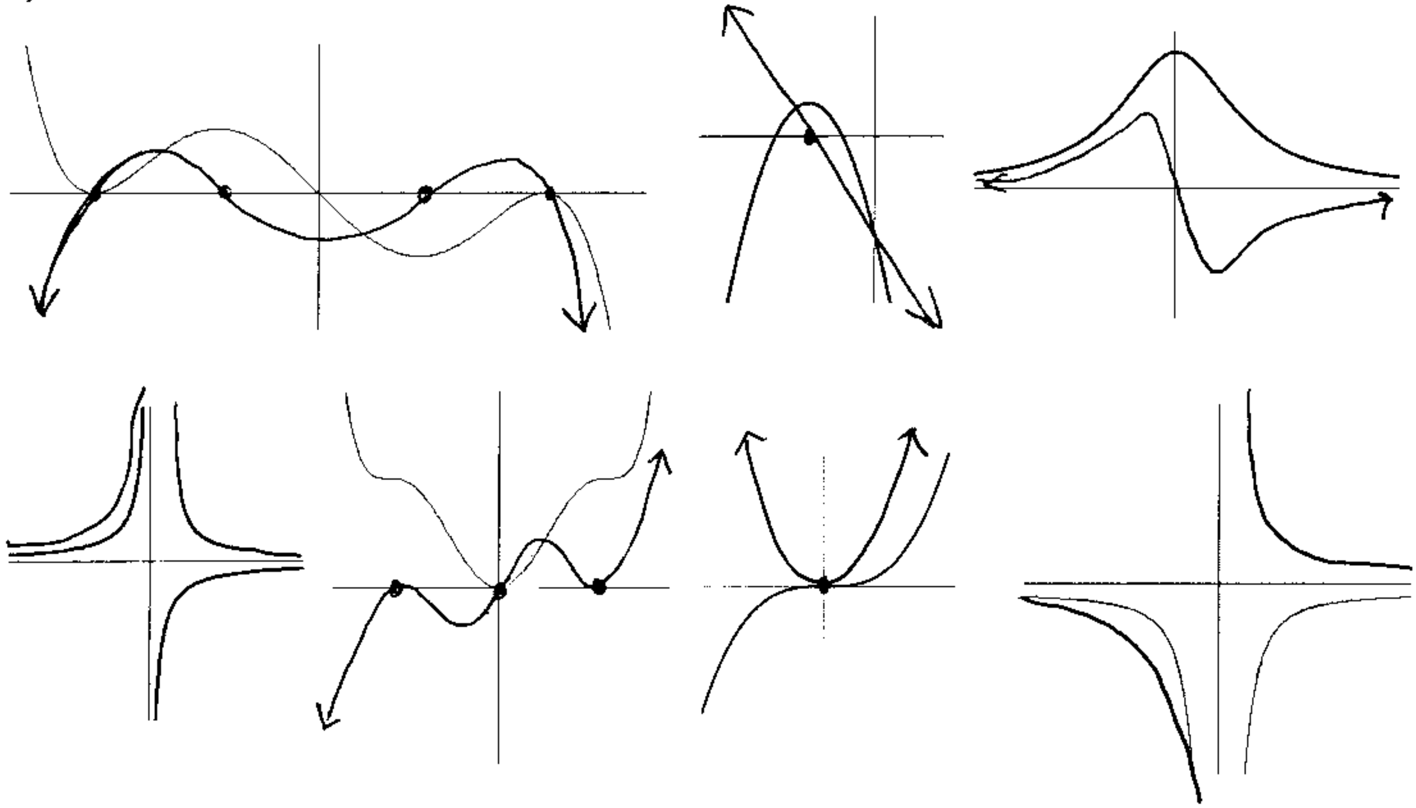
$$f'(x) = \lim_{h \to 0} \frac{-(x+h)^3 - 5(x+h) + 1 - (-x^3 - 5x + 1)}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{-x^3} - 3x^2h - 3xh^2 - h^3 \cancel{-5x} - 5h \cancel{+1} + \cancel{x^3} + \cancel{5x} \cancel{-1}}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{h}(-3x^2 - 3xh - h^2 - 5)}{\cancel{h}} \Rightarrow -3x^2 - 3x(0) - (0)^2 - 5$$

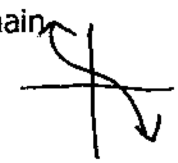
$$\boxed{f'(x) = -3x^2 - 5}$$

4) Sketch the first derivatives of the functions below.



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

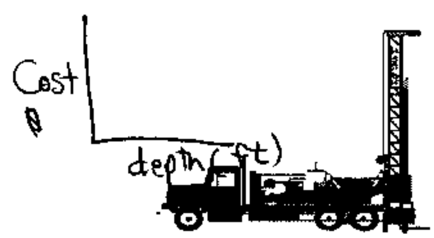
a) f′(x) < 0 for all x in the domain
f″(x) > 0 for x < 0
f″(x) < 0 for x > 0



f′(x) > 0 for x < 0
f′(x) < 0 for x > 0
f″(x) < 0 for all x in the domain

6) 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 A 85 ft deep well costs $900.

(b) f′(75)=15 At 75 ft, the cost is increasing by $15/ft.

(c) f″(x)=0.10 for all x. The cost per foot increases by $.10 per foot each foot.

Sketch f(x), f′(x), and f″(x) below: