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Determine if true or false for each of the following statements. (5 points each)

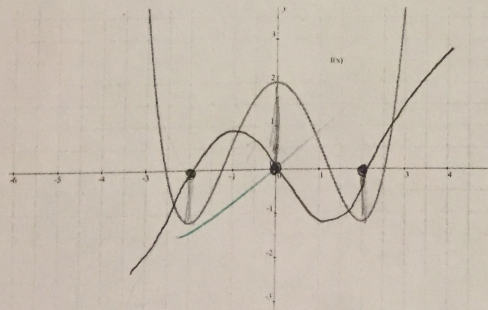
- The function $f(x) = -3x^3 - 3x^2 + 14$ has only one critical point.
- Let f be a function whose second derivative exists on an open interval, if $f''(x) > 0$ for all x in that interval, then the graph of f is concave downward on that interval.
- If " a " is a critical point of the function $f(x)$ that is continuous, and if $f'(x) < 0$ at $(-\infty, a)$ and $f'(x) > 0$ at (a, ∞) , then, $f(x)$ has a relative maximum at $(a, f(a))$.
- The function $f(x) = x^4 - 4$ has a relative maximum at $(0, -4)$
 $4x^3$ $x=0$ $(-\infty, 0)$ $(0, \infty)$

Choose the right answer (10 points each)

- If $(c, f(c))$ is a critical point, then
 (A) $f'(c) = 0$ (B) $f'(c) < 0$ (C) $f'(c) = 0$ (D) $f'(c) > 0$
 derivative = ϕ
- According to the second derivative test if $f''(c) < 0$, then
 (A) $f(c)$ is concave upward.
 (B) $f(c)$ is relative maximum.
 (C) $f(c)$ is a critical point.
 (D) $f(c)$ is a relative minimum.
- The function $f(x) = 20x - x^2$ has a critical point:
 (A) $x = -10$ (B) $x = 10$ (C) $x = 1$ (D) $x = 0$
 $x(20-x)$ $x=0, x=20$
- If $f''(c) > 0$ then $f(x)$ is:
 (A) concave downward (B) concave upward (C) decreasing (D) increasing
- It can be determined if the curve of $y=f(x)$ has a change of concavity:
 (A) Inflection point (B) Critical point (C) x-intersect (D) y-intercept
- The function $y = -x^3 + 6x^2$ has a relative maximum at:
 (A) $(4, -32)$ (B) $(0, 0)$ (C) $(4, 32)$ (D) $(6, 0)$
 $-3x^2 + 12x$ $x=(0, 0)$
 $(-3x)(x-4)$ $x=(4, 32)$
- The function $y = x^3 - 3x^2$ has a relative minimum at:
 (A) $(1, -2)$ (B) $(3, 0)$ (C) $(0, 0)$ (D) $(2, -4)$
 $3x^2 - 6x$
 $3x(x-2)$
 $x=0, x=2$

Answer the following showing your entire procedure.

- The following graph represents $f(x)$ use it to sketch the graphs of $f'(x)$. (10 points)



$(0, 0) \rightarrow (2, -4)$

Connections 3rd Partial - Quiz 2.

1) The function $f(x) = x^4 - 4$ has a relative maximum at $x=0$ $y=-4$
• $\neq \rightarrow$ that is its relative minimum.

2) If $(c, f(c))$ is a critical point, then
 $f'(c) = 0$

3) The function $f(x) = 20x - x^2$ has a critical point:

$$f'(x) = 20 - 2x$$
$$x = 10$$

