Ms. McCleary's "Problems to Ponder" **2010ponder.doc**
[non-calculator problems]
How do problems #1 and #2 differ from each other?

1. The polynomial function f has selected values for its second derivative f'' given in the table below. Based on the table, which of the following statements must be true?

x	0	1	2	3
f''	5	0	-7	4

(A) f is increasing on the interval (0, 2)
(B) f is decreasing on the interval (0, 2)
(C) f has a local maximum at $x=1$
(D) The graph of f has a point of inflection at $x=1$
(E) The graph of f changes concavity in the interval (0, 2)

2. The function f has selected values for its second derivative f'' given in the table below. f'' is a strictly decreasing function for the interval [0, 3]. Based on the table, which of the following statements must be true?

x	0	1	2	3
f''	5	0	-3	-4

(A) f is increasing on the interval (0, 2)
(B) f is decreasing on the interval (0, 2)
(C) f has a local maximum at $x=1$
(D) The graph of f has a point of inflection at $x=1$ at x=1 f'' changes from positive to negative values
(E) The graph of f changes concavity in the interval (0, 2)

How do problems #3 and #4 differ from each other?

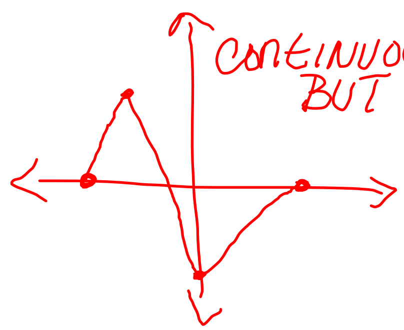
3. The function f is continuous for $-2 \le x \le 2$ with selected values given in the table below. Based on the table, which of the following statements must be true?

x	-2	-1	0	2
$f(x)$	0	5	-5	0

this is MVT

(A) There is some $c, -2 < c < 2$ such that $f'(c) = 0$
(B) There is some $c, -2 < c < 2$ such that $f(c) = 10$
(C) There is some $c, -2 < c < 2$ such that $f(c) = -10$
(D) There is some $c, -1 < c < 0$ such that $f(c) = 0$ IVT
(E) There is some $c, -2 < c < 2$ such that $f''(c) = 0$

CONTINUOUS BUT NOT DIFF.



4. The function f is differentiable for $-2 \le x \le 2$ with selected values given in the table below. Based on the table, which of the following statements must be true?

x	-2	-1	0	2
$f(x)$	0	5	-5	0

MVT

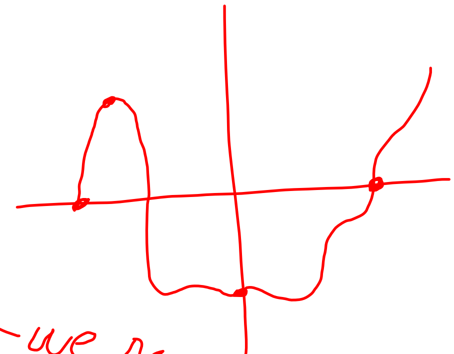
(A) There is some $c, -2 < c < 2$ such that $f'(c) = 0$

(B) There is some $c, -2 < c < 2$ such that $f(c) = 10$

(C) There is some $c, -2 < c < 2$ such that $f(c) = -10$

(D) There is some $c, -1 < c < 0$ such that $f'(c) = 0$

(E) There is some $c, -1 < c < 0$ such that $f''(c) = 0$



we ARE GUARANTEED there is a c, $-1 < c < 0$ such that $f'(c) = \dfrac{f(0) - f(-1)}{0 - (-1)}$

How can you easily get "tricked" by problem #5?

5. Let f be a twice-differentiable function whose second derivative, f'' is defined by $f''(x) = x(x+3)(x-3)^2$. Where does f have point(s) of inflection?

(A) At $x = 0$ only

(B) At $x = -3$ only

(C) At $x = 0$ and $x = -3$ only

(D) At $x = 0$, $x = -3$, and $x = 3$

(E) At $x = 0$ and $x = 3$ only

Possible Points of Inflection at $x = 0, -3, 3$

$(-\infty, -3)$ $f'' > 0$

$(-3, 0)$ $f'' < 0$

$(0, 3)$ $f'' > 0$

$(3, \infty)$ $f'' > 0$

$\left.\begin{array}{l} x = -3 \\ x = 0 \end{array}\right\}$ Points of Inflection here only