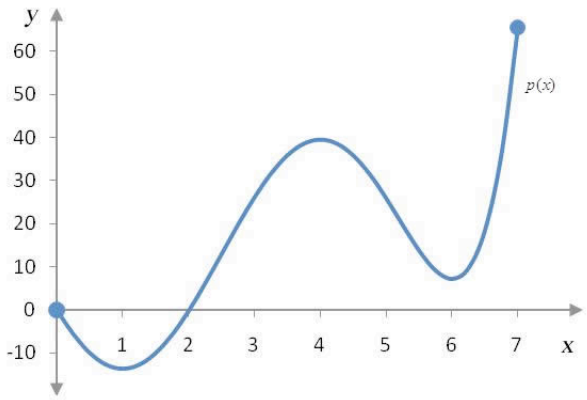
Name_____ Date_____ Period_____

TEST: 3.1-3.5, NO CALCULATOR

Part I: Multiple Choice: Put the letter in the letter place. Be sure it's write, wright, rite, . . . correct.

_____ 1. If $f(x)=3x^5-4x^4+7x^3-e^x$, what is $\lim_{h\to 0}\dfrac{f^{(5)}(0+h)-f^{(5)}(0)}{h}$?

(A) 1 (B) -1 (C) 359 (D) 361 (E) 0



_____ 2. The graph of a differentiable function $p(x)$ is shown above. For how many values of x on $[0,7]$ is the MVT satisfied?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

_____ 3. The function g is differentiable and non-linear for $-4\le x\le 6$. If $g(-4)=-\dfrac{1}{2}$ and $g(6)=\dfrac{1}{2}$, then for some $r\in(-4,6)$, which of the following must be true?

I. $g(r)=0$ II. $g'(r)=0$ III. $g'(r)=\dfrac{1}{10}$

(A) I only (B) II only (C) III only (D) I and II only (E) I and III only

_____ 4. Let $f(x)$ be a differentiable function such that $f(-b)=3$, $b>0$, and $f'(x)\le 5$ for all x. What is the largest possible value of $f(b)$?

(A) $10b$ (B) $3+10b$ (C) $5b$ (D) $3+5b$ (E) $20b$

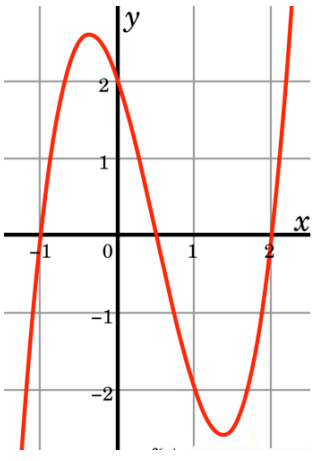
_____ 5. The graph of a twice-differentiabl function h is shown at right. Arrange the following expressions from smallest to largest.

I. $h(-1)+h(2)$

II. $h'(-1)+h'(2)$

III. $h''(-1)-h''(2)$

(A) III, II, I (B) II, III, I (C) I, III, II (D) III, I, II (E) I, II, III



_____ 6. If $f'(x)=\left[x(x-5)^3(2x-3)^{-2/3}\right]^3$ for some continuous function f, then f has which of the following?

I. Local minimum at $x=0$

II. Local minimum at $x=5$

III. Local maximum at $x=\frac{3}{2}$

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

_____ 7. It was reported this week that the price of gasoline is still falling, but not as fast as it was last week. If P is current price of gasoline, which of the following statements is true?

I. $P>0$ II. $P<0$ III. $\frac{dP}{dt}>0$ IV. $\frac{dP}{dt}<0$ V. $\frac{d^2P}{dt^2}>0$ VI. $\frac{d^2P}{dt^2}<0$

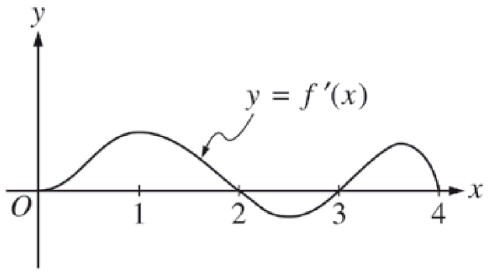
(A) I, III, V only (B) I, IV, VI only (C) I, III, VI only (D) I, IV, V only (E) II, III, VI only

_____ 8. If $f'(x)=-e^{2x}\left(5+2x-x^2\right)$, for what values of x is f concave down?

(A) $(-\infty,-3)\cup(2,\infty)$ (B) $(-\infty,-2)\cup(3,\infty)$ (C) $(-3,2)$ (D) $(-2,3)$ (E) $\left(-\sqrt{7},\sqrt{7}\right)$

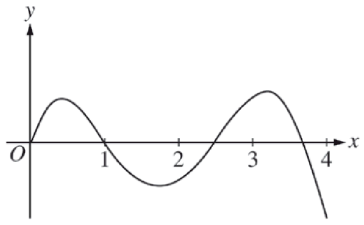
_____ 9. A critter is moving along a horizontal wire with position function $x(t)=t^4-8t^3+18t^2-216t+1$ for $t\in[0,4]$. What is the critter's velocity at the time when the critter attains its minimum acceleration?

(A) −216 (B) −240 (C) −208 (D) −407 (E) −12

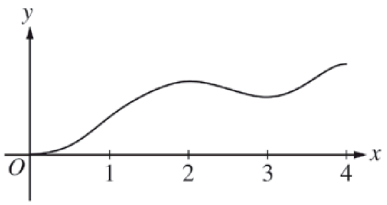


_____ 10. The figure above shows the graph of f', the derivative of the functin f. If $f(0)=0$, which of the following could be the graph of f?

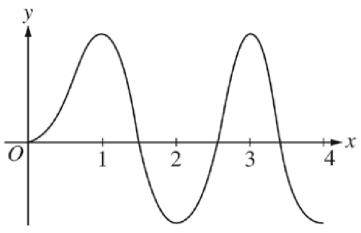
(A)



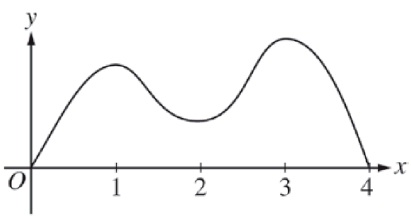
(B)



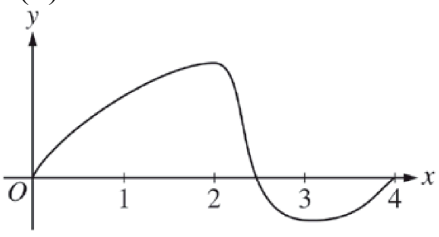
(C)



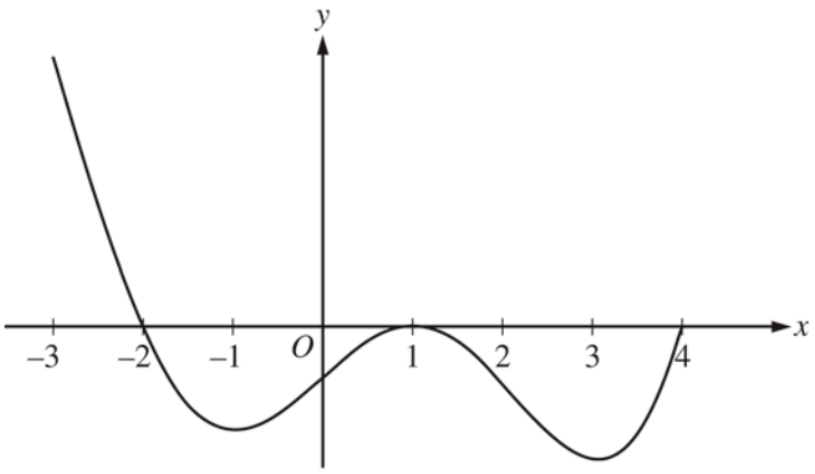
(D)



(E)



Part II: Free Response
Say what you want, but be sure to document and say it correctly with correct documentation.

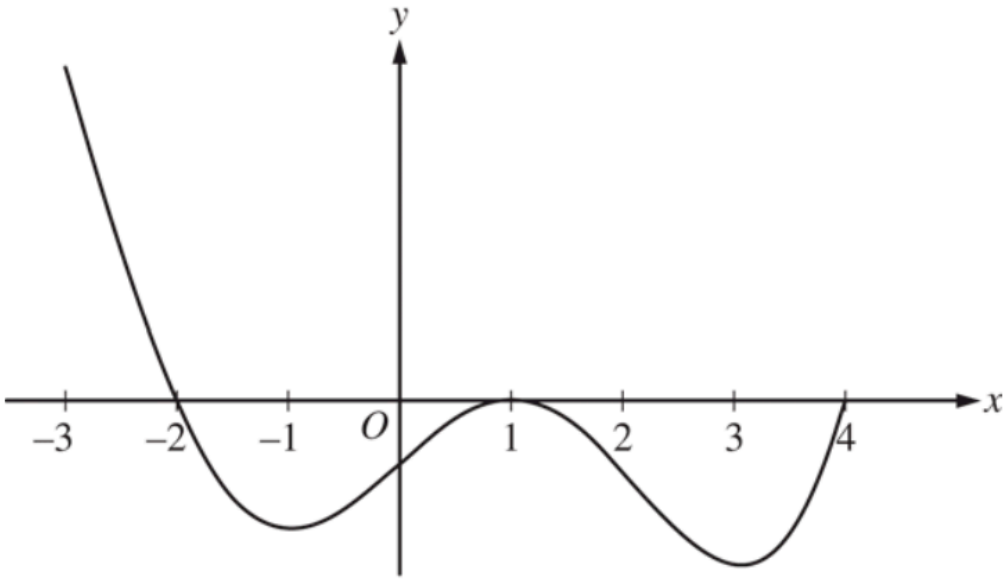


Graph of f'

11. The figure above shows the graph of f', the derivative of a twice-differentiable function f, on the interval $[-3, 4]$. The graph of f' has horizontal tangents at $x = -1$, $x = 1$, and $x = 3$.

(a) Find all x-coordiantes at which f has a relative maximum. Give a reason for your answer.
(b) On what open itervals contained in $-3 < x < 4$ is the graph of f both concave down and decreasing? Give a reason for your answer.
(c) Find the x-coordinates of all points of inflection for the graph of f. Give a reason for your answer.

(d) On the graph below, on the same axes as the graph of f' sketch a possible graph of $f''(x)$



(e) If $f(0)=0$, on the graph below, on the same axes as the graph of f' sketch a possible graph of $f(x)$.
For $-3 \le x < 4$, at what value of x does f attain it global maximum value?