

- 76) a)  $f(a)$  exists  $\rightarrow$  there is a pt  $(a, f(a))$  TRUE  
 b)  $f(x)$  is graphed on  $(0, a)$  TRUE  
 c)  $f$  is not cont @  $x=a$  TRUE here @  $x=a$   
 d)  $\lim_{x \rightarrow a} f(x)$  exists TRUE  
 $\lim_{x \rightarrow a^-} f(x) = \lim_{x \rightarrow a^+} f(x)$   
 e)  $\lim_{x \rightarrow a} f'(x)$  exists FALSE  
 "Sharp turn"

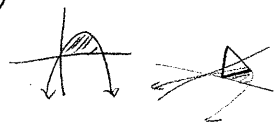
E

77)  $P(x) = 3x^2 - 5x^3 + 7x^4 + 3x^5$   
 $P'(x) = 6x - 15x^2 + 28x^3 + 15x^4$   
 $P''(x) = 6 - 30x + 84x^2 + 60x^3$   
 $P'''(x) = -30 + 168x + 180x^2$   
 $P'''(0) = -30$   
 A

82)  $r(t) = t^3 - 4t^2 + 6$   
 change in altitude =  $\int_a^b r(t) dt$   
 altitude dec when  $r(t) < 0$   
 on  $(1.572, 3.514)$   
 $A = \int_{1.572}^{3.514} r(t) dt$

- 83) a) maybe  
 b) maybe  
 c) maybe  
 d) maybe  
 e) yes, MVT  
 since  $\frac{f(4) - f(0)}{4 - 0} = \frac{2 - 2}{4} = 0$

E

87)   
 $A = \frac{\sqrt{3}}{4} 5^2$   
 $= \frac{\sqrt{3}}{4} (2x - x^2)^2$   
 $V = \int_0^2 \frac{\sqrt{3}}{4} (2x - x^2)^2 dx$   
 $= .462$   
 D

- 88)  $f' \begin{matrix} + & + & + & - \\ 0 & 1 & 2 & \end{matrix}$   
 I.  $f(0) > f(1)$  False  
 b/c  $f' > 0$  on  $(0, 1)$   
 inc  
 II.  $f(2) > f(1)$  True  
 b/c  $f' > 0$  on  $(1, 2)$   
 inc  
 III.  $f(1) > f(3)$  False  
 $f(1) = \int_0^1 f'(t) dt$   
 $f(3) = \int_0^3 f'(t) dt \rightarrow$  more positive area than  $\int_0^1 f'(t) dt$   
 so,  $f(3) > f(1)$

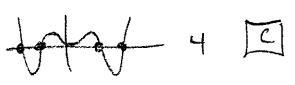
B

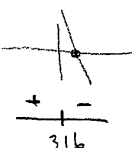
78)  $\frac{dr}{dt} = 0.2 \text{ m/sec}$   
 $A = \pi r^2$        $C = 2\pi r$   
 $\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$        $20\pi = 2\pi r$   
 $= 20\pi(2)$   
 $= 4\pi \text{ m}^2/\text{sec}$   
 C

84) speed =  $|v(t)| = \sqrt{(x'(t))^2 + (y'(t))^2}$   
 $v(3) = \sqrt{(x'(3))^2 + (y'(3))^2}$   
 $= 6.884$   
 C

~~85) graph derivative of f'(x) and count sign changes on (-1.8, 1.8)~~

79)  $h(x) = f(g(x))$   
 $h'(x) = f'(g(x)) \cdot g'(x)$   
 $h'(1) = f'(g(1)) \cdot g'(1)$   
 $= f'(-1) \cdot 2$   
 $= 5 \cdot 2$   
 $= 10$   
 D

85) graph derivative of  $f'(x)$  and count sign changes on  $(-1.8, 1.8)$   
  
 C

89) max velocity  $\rightarrow h'(t)$  max  
 so, need  $h''(t)$   
 graph  $h''(t)$   
  
 or graph  $h'(t)$  + find max  
 $h(0.316) = 10.263$   
 B

80)  $\frac{dD}{dt} = \frac{100e^{-.1t}}{2 - e^{-.3t}}$   
 tons destroyed =  $\int_7^{14} \left( \frac{100e^{-.1t}}{2 - e^{-.3t}} \right) dt$   
 $= 124,994$   
 A

86) graph  $v(t) = 0$   
 $t = .655$   
 $x(.655) = x(0) + \int_0^{.655} v(t) dt$   
 $= 2.816$   
 C

90) inst rate of change  $\rightarrow f'(x)$   
 average rate of change  $\rightarrow \frac{f(b) - f(a)}{b - a}$   
 $1 + \frac{1}{x} = \frac{f(4) - f(1)}{4 - 1}$   
 $1 + \frac{1}{x} = \frac{4 + \ln 4 - 1}{3}$   
 $x = 2.164$   
 C

~~88) graph derivative of f'(x) and count sign changes on (-1.8, 1.8)~~

81)  $\lim_{x \rightarrow 1} \sin(f(x))$   
 $\Rightarrow \lim_{x \rightarrow 1} \sin(f(x)) = \lim_{x \rightarrow 1} \sin(f(x))$   
 $\sin(f(1^-))$        $\sin(f(1^+))$   
 $.909$   
 A