

# Calculus 5.1 Applications

$$\textcircled{50} P'(t) = \frac{10(.19)(.19t+1)}{(.19t+1)^2} - 10(\ln(.19t+1))(.19)$$

$$P'(t) = \frac{1.9 - 1.9 \ln(.19t+1)}{(.19t+1)^2} = 0 \Rightarrow 1.9 - 1.9 \ln(.19t+1) = 0$$

$$1.9 = 1.9 \ln(.19t+1)$$

$$1 = \ln(.19t+1)$$

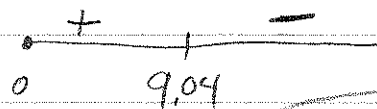
other critical #

$$.19t+1=0$$

$$t \approx -5.26 \text{ (Doesn't work, } t \text{ is \# of Days)}$$

$$e' = .19t+1$$

$$\frac{e-1}{.19} = t \approx 9.04$$



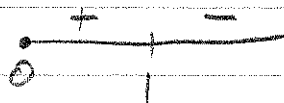
# of people infected will start to decrease after the 9<sup>th</sup> day

$$\textcircled{53} K'(t) = \frac{5(t^2+1) - (5t)(2t)}{(t^2+1)^2} = \frac{5t^2+5-10t^2}{(t^2+1)^2} = \frac{-5t^2+5}{(t^2+1)^2}$$

$$-5t^2+5=0$$

$$t^2=1$$

$$t = \pm 1 \text{ (only use 1)}$$



Concentration Increasing in first hour

Decreasing after the first hour

$$(54) D'(p) = .000006 p^2 - .0016p + .1141 = 0$$

$D(p)$  doesn't = 0 in interval given

$D'(p)$  is positive for entire domain

⇒ Increasing  $55 \leq p \leq 130$   
Decreasing: —

$$(55) a) F'(t) = (175.9)e^{-t/1.3} + (175.9t) \left( e^{-t/1.3} \right) \left( -\frac{1}{1.3} \right)$$

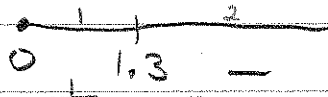
$$F'(t) = 175.9 e^{-t/1.3} \left[ 1 - \frac{t}{1.3} \right]$$

$$b) 175.9 e^{-t/1.3} \left[ 1 - \frac{t}{1.3} \right] = 0$$

$$175.9 e^{-t/1.3} = 0 \quad 1 - \frac{t}{1.3} = 0$$

No Solutions

$$1.3 = t$$



Inc:  $0 < t < 1.3$

the thermic effect of food  
is increasing during the  
first 1.3 hours

Dec:  $t > 1.3$

the thermic effect of  
Food is decreasing after  
1.3 hours

$$(56) W'(t) = 766.6934 (1 - .905e^{-.002t})^{-.2386} (-.905e^{-.002t}) (-.002)$$

$$W'(t) = 1.3877 e^{-.002t} (1 - .905e^{-.002t})^{-.2386} = 0$$

$$1.3877 e^{-.002t} = 0$$

No solution

$$1 - .905e^{-.002t} = 0$$

$$1 = .905e^{-.002t}$$

$$1.10497 = e^{-.002t}$$

$$\ln 1.10497 = -.002t$$

$$-49.9 = t$$

this value doesn't work

therefore this function  
is always increasing  
 $t > 0$

$$(57) f'(x) = \frac{1}{\sqrt{2\pi}} \left( e^{-\frac{x^2}{2}} \right) (-x) = 0$$

$$\frac{1}{\sqrt{2\pi}} = 0$$

$$e^{-\frac{x^2}{2}} = 0$$

$$-x = 0$$

No Solutions

$$x = 0$$

-1 | 1  
+ 0 -

Increasing  $x < 0$

Decreasing  $x > 0$

(60) a)  $f'(x)$  is negative because the mileage is decreasing  $\Rightarrow f' < 0$

b) MPG

Lb