

Calculus 5.1

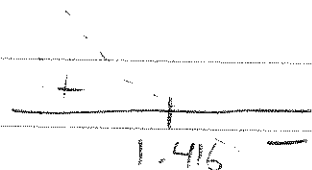
- ② a)  $(-\infty, 4)$     ④ a)  $(3, \infty)$     ⑥ a)  $(1, 5)$   
 b)  $(4, \infty)$     b)  $(-\infty, 3)$     b)  $(-\infty, 1) \cup (5, \infty)$

- ⑧ a)  $(-3, 0) \cup (3, \infty)$     ⑩ a)  $(3, 5)$   
 b)  $(-\infty, -3) \cup (0, 3)$     b)  $(-\infty, 3) \cup (5, \infty)$

- ⑫ a)  $(-\infty, -3) \cup (-3, 0) \cup (0, 3) \cup (3, \infty)$   
 b) —

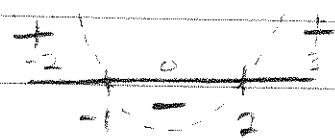
⑬  $\frac{dy}{dx} = 3.4 - 2.4x = 0$

$x = 1.416$



Inc:  $x < 1.416$     Dec:  $x > 1.416$

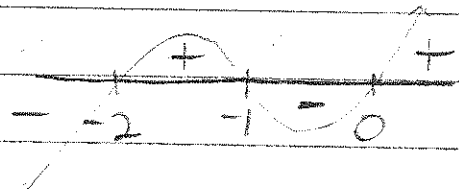
⑭  $F'(x) = 2x^2 - 2x - 4 = 0$   
 $2(x^2 - x - 2) = 0$   
 $2(x-2)(x+1) = 0$



$x = 2$      $x = -1$

Inc:  $x < -1$  &  $x > 2$   
 Dec:  $-1 < x < 2$

⑰  $F'(x) = 4x^3 + 12x^2 + 8x = 0$   
 $= 4x(x^2 + 3x + 2) = 0$   
 $4x(x+2)(x+1) = 0$



$x = 0$      $x = -2$      $x = -1$

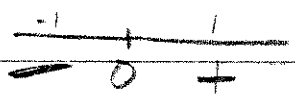
Inc:  $-2 < x < -1$ ,  $x > 0$   
 Dec:  $x < -2$ ,  $-1 < x < 0$

$$(22) \frac{dy}{dx} = 6$$

No critical #  
always positive  $\Rightarrow$  Function is always increasing

$$(25) \frac{dy}{dx} = \frac{1}{2} (x^2+1)^{-1/2} (2x) = \frac{2x}{2(\sqrt{x^2+1})} = \frac{x}{\sqrt{x^2+1}}$$

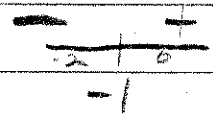
$x=0$  is only critical #



increasing  $x > 0$   
Dec:  $x < 0$

$$(28) f'(x) = \frac{4}{5} (x+1)^{-1/5} (1) = \frac{4}{5(x+1)^{1/5}} \neq 0$$

$f'(x) = DNE$   
@  $x = -1$



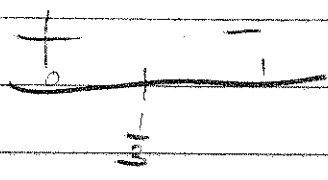
Inc:  $x > -1$   
Dec:  $x < -1$

$$(31) f'(x) = (1)e^{-3x} + x(e^{-3x})(-3) = e^{-3x}(1-3x) = 0$$

$$e^{-3x} = 0 \quad 1-3x = 0$$

No sol.

$$x = \frac{1}{3}$$



Inc:  $x < \frac{1}{3}$   
Dec:  $x > \frac{1}{3}$

$$(34) F'(x) = (1)(2^{-x^2}) + x(\ln 2)(2^{-x^2})(-2x)$$

$$= (2^{-x^2})(1 - 2x^2 \ln 2) = 0$$

$$2^{-x^2} = 0$$

No solut.

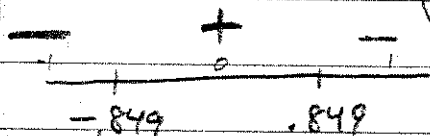
$$1 - 2x^2 \ln 2 = 0$$

$$\frac{1}{2 \ln 2} = \frac{2x^2 \ln 2}{2 \ln 2}$$

$$\sqrt{\frac{1}{2 \ln 2}} = \sqrt{x^2} \Rightarrow$$

$$x = \pm \sqrt{\frac{1}{2 \ln 2}}$$

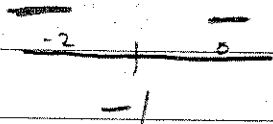
$$\approx \pm 0.849$$



Inc:  $-0.849 < x < 0.849$

Dec:  $x < -0.849$  &  $x > 0.849$

$$(23) F'(x) = \frac{1(x+1) - (x+2)(1)}{(x+1)^2} = \frac{-1}{(x+1)^2} \neq 0 \text{ but DNE @ } x = -1$$



Inc: —

Dec:  $x < -1, x > -1$