4.3 Day 2

Tuesday, November 13, 2012
7:10 AM

Section 4.3
p. 215: 13,15,17, 22, 24, 26, 30, 39, 41

13. $y = xe^x$

$y' = xe^x + e^x$

$y'' = xe^x + e^x + e^x$

$0 = xe^x + 2e^x$

$0 = e^x(x+2)$

$x = -2$ CV

y'': Concave down | Concave up

N -2 P

$y = -2e^{-2} = \frac{-2}{e^2}$

The is a point of inflection on y of $\left(-2, \frac{-2}{e^2}\right)$ because y'' changes signs @ $x=-2$.

15. $y = \tan^{-1} x$

$y' = \frac{1}{x^2+1} = (x^2+1)^{-1}$

$y'' = -(x^2+1)^{-2} \cdot 2x = \frac{-2x}{(x^2+1)^2}$

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

y'': Concave up | Concave down

P 0 N

$y = \tan^{-1}(0) = 0$

Point of inflection $(0,0)$

17. $y = x^{1/3}(x-4) = x^{4/3} - 4x^{1/3}$

$y' = \frac{4}{3}x^{1/3} - 4/3\, x^{-2/3}$ or $y' = \frac{4x-4}{3x^{2/3}}$

y'': concave up | concave down | concave up

P -2 N 0 P

$y'' = \frac{4}{9}x^{-2/3} + \frac{2}{9}x^{-5/3}$

$= \frac{4}{9x^{2/3}} \cdot \frac{x^{3/3}}{x^{3/3}} + \frac{8}{9x^{5/3}} = \frac{4x+8}{9x^{5/3}}$

$\frac{4x+8}{9x^{5/3}} = 0$ $4x+8=0$

$x = -2$ CV

y'' is und $x=0$ CV

$y = (-2)^{1/3}(-2-4)$

$y = -1\sqrt[3]{-2} = 1\sqrt[3]{2}$

$y = 0^{1/3}(0-4) = 0$

points of inflection

$(-2, 1\sqrt[3]{2})$ and $(0,0)$

22a $f'(x)=0$ @ $x = \pm 1.25$ 0

24a $[-2, 2]$

22a $f'(x)=0$ @ $x = \pm 1.25, 0$
positive $(-1.25, 0) \cup (1.25, \infty)$
negative $(-\infty, -1.25) \cup (0, 1.25)$

b. $f''(x) = 0$ @ $x = \pm 0.7$
pos. $(-\infty, -0.7) \cup (0.7, \infty)$
neg. $(-0.7, 0.7)$

24a $[-2, 2]$
b. $(-\infty, -2] \cup [2, \infty)$
c. Local min. @ $x = -2$
Local max @ $x = 2$

26. $x(t) = 6 - 2t - t^2$
a. $x'(t) = v(t) = -2 - 2t$
b. $x''(t) = v'(t) = a(t) = -2$
c. The particle begins @ 6 and moves in the negative direction for all values of t in the domain.

30a. $v(t) = 0$ @ $t = -0.2$, $t = 4$ & $t = 12$
b. $a(t) = 0$ @ $t = 1.5$, $t = 5.2$, $t = 8$, $t = 11$, and $t = 13$

39. $y' = (x-1)^2(x-2)$
a. $0 = (x-1)^2(x-2)$
$x = 1 \quad x = 2$

f': N | N | P (at $x = 1$ and $x = 2$)

a. No local max b. local & absolute min @ $x = 2$

c. $y'' = (x-1)^2(1) + (x-2)(2(x-1)(1))$
$0 = (x-1)^2 + 2(x-1)(x-2)$
$0 = (x-1)((x-1) + 2(x-2))$
$0 = (x-1)(3x-5)$
$x = 1 \quad x = 5/3$

f'': CCU | CCD | CCU
P | N | P (at $x = 1$ and $x = 5/3$)

The points of inflection occur @ $x = 1$ & $x = 5/3$

41.