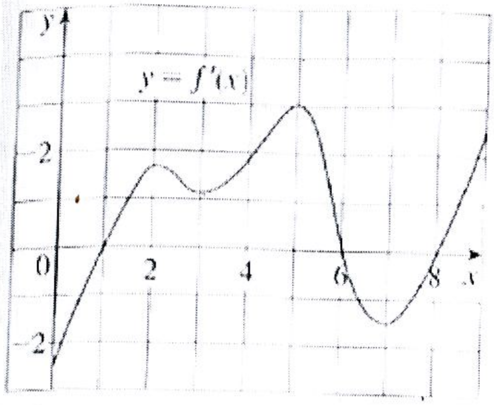
Name_______________________________Pd.____

Day 4 Curve Sketching

uous function f is shown

2.



$- \searrow \; 1 \; + \nearrow \; 6 \; \searrow - \; 8 \; \nearrow +$

$+ \; 2 \; - \; 3 \; + \; 5 \; - \; 7 \; +$

a.) The open intervals of which f is increasing.? Decreasing?

Inc: (1,6)(8,9) Dec: (0,1)(6,8)

b.) At what values of x does f have a local maximum? Local minimum?

Max: X=6 Min: X=1 & X=8

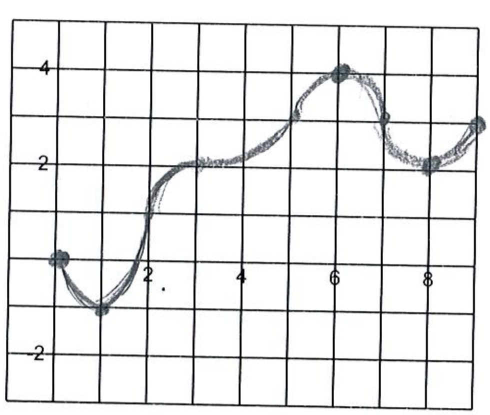
c.) The open intervals of which f is concave upward. Concave downward?

CC↑: (0,2)(3,5)(7,9) CC↓: (2,3)(5,7)

d.) State the x-coordinate(s) of the point(s) of inflection.

POI: X=2, 3, 5, & 7

e.) Assuming that f(0)=0, sketch the graph of f.



4. $G(x) = 5x^{\frac{2}{3}} - 2x^{\frac{5}{3}}$

a.) Find intervals

increase: (0,1)

decrease: $(-\infty, 0) \cup (1, \infty)$

b.) Find

local max: X=1

local min: X=0

c.) Find intervals

concave up: $(-\infty, -\frac{1}{2})$

concave down: $(-\frac{1}{2}, 0) \cup (0, \infty)$

P.O.I. $X = -\frac{1}{2}$

d.)Use a)-c) to sketch

$f(-\frac{1}{2}) = 3.78$

$f(0) = 0$

$f(1) = 3$

$\searrow \; 0 \; \nearrow \; 1 \; \searrow$

$- \; | \; + \; | \; -$

$+ \; -\frac{1}{2} \; - \; 0 \; -$

$f'(x) = \frac{10}{3}x^{-1/3} - \frac{10}{3}x^{2/3}$

$f'(x) = \frac{10}{3x^{1/3}} - \frac{10x^{2/3}(x^{1/3})}{3(x^{1/3})}$

$f'(-1) = \frac{\pm}{-} = -$

$f'(\frac{1}{2}) = \frac{+}{+} = +$

$f'(x) = \frac{10(1-x)}{3x^{1/3}}$ $x=1$ $x=0$

$f'(2) = \frac{-}{+} = -$

$f'(x) = \frac{10-10x}{3x^{1/3}}$

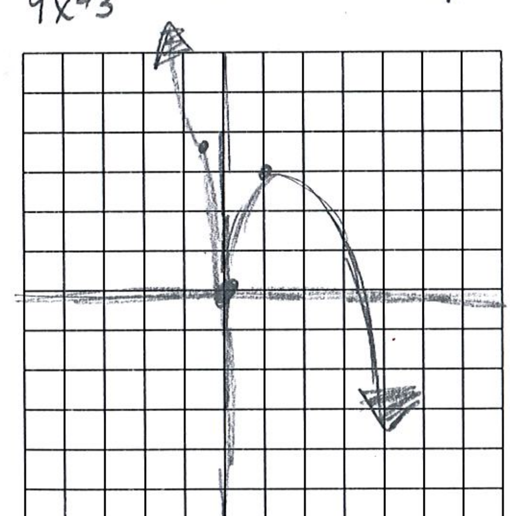
$f''(x) = \frac{3x^{1/3}[-10] - [10-10x]x^{-2/3}}{(3x^{1/3})^2}$

$f''(x) = \frac{\frac{-30x^{1/3}(x^{2/3})}{(x^{2/3})} - \frac{[10-10x]}{x^{2/3}}}{9x^{2/3}}$

$\frac{-30x-10+10x}{x^{2/3}} \cdot \frac{1}{9x^{2/3}}$

$\frac{9x^{2/3}}{\cancel{9x^{2/3}}}$

$\frac{-20x-10}{9x^{4/3}}$ $x = -\frac{1}{2}$ $x=0$



Name________________________________Pd.____

Day 4 Curve Sketching

$f(-1) = -3$

$f(0) = 0$

$f(2) = 7.6$

6. $C(x) = x^{\frac{1}{3}}(x+4) = x^{4/3} + 4x^{1/3}$

a.) Find intervals

increase: $(-1, \infty)$

decrease: $(-\infty, -1)$

b.) Find

local max: none

local min: $x = -1$

c.) Find intervals

concave up: $(-\infty, 0)(2, \infty)$

concave down: $(0, 2)$

P.O.I. $x = 0$ & $x = 2$

d.) Use a)-c) to sketch

$-$ | -1 | $+$ | 0 | $+$

$+$ | 0 | $-$ | 2 | $+$

$$C'(x) = \frac{4}{3}x^{1/3} + \frac{4}{3}x^{-2/3} = \frac{4}{3}\left(x^{1/3}\frac{(x^{2/3})}{(x^{2/3})} + \frac{1}{x^{2/3}}\right)$$

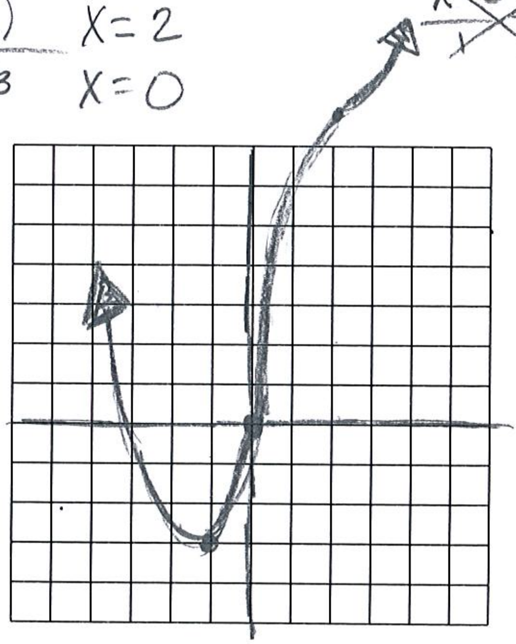
$$C'(x) = \frac{4}{3}\left(\frac{x+1}{x^{2/3}}\right) \quad x = -1 \quad x = 0$$

$$C''(x) = \frac{4}{3}\left[\frac{x^{2/3}(1) - (x+1)\frac{2}{3}x^{-1/3}}{x^{4/3}}\right]$$

$$C''(x) = \frac{4}{3}\left[\frac{\frac{x^{2/3}(3x^{1/3})}{(3x^{1/3})} - \frac{2(x+1)}{3x^{1/3}}}{x^{4/3}}\right] = \frac{4}{3}\left[\frac{3x-2x-2}{3x^{1/3}}\right]\frac{1}{x^{4/3}}$$

$$\cancel{\frac{x^{4/3}}{1} \times \frac{1}{x^{4/3}}}$$

$$= \frac{4}{3}\frac{(x-2)}{3x^{5/3}} \quad x = 2 \quad x = 0$$



8. $f(x) = \dfrac{e^x}{1-e^x}$

$f(1) = -1.58$

$f(-1) = .58$

a.) Find

VA: $1 - e^x = 0 \quad x = 0$

HA: $y = -1$

b.) Find intervals

Increase: $(-\infty, 0)(0, \infty)$

Decrease: none

c.) Find

Local Max(s): none

Local Min(s): none

$+$ | 0 | $+$

d.) Find intervals

Concave Up: $(-\infty, 0)$

Concave Down: $(0, \infty)$

$+$ | 0 | $-$

e.) Use a)-d) to sketch

$$f'(x) = \frac{(1-e^x)e^x - e^x(-e^x)}{(1-e^x)^2} = \frac{e^x(1 - \cancel{e^x} + \cancel{e^x})}{(1-e^x)^2}$$

$$f'(x) = \frac{e^x}{(1-e^x)^2} \quad e^x \neq 0 \quad 1 - e^x = 0 \quad e^x = 1 \quad x = \ln(1)$$

$x = 0$

$$f''(x) = \frac{(1-e^x)^2 e^x - e^x(2)(1-e^x)(-e^x)}{(1-e^x)^4}$$

$$f''(x) = \frac{e^x(\cancel{1-e^x})[1 - e^x + 2e^x]}{(1-e^x)^{\cancel{4}3}}$$

$$f''(x) = \frac{e^x[1+e^x]}{(1-e^x)^3} \quad e^x \neq 0 \quad 1 + e^x = 0 \quad \cancel{e^x = -1}$$

$1 - e^x = 0$

$x = 0$