

C12 - 3.4 - Root/Rational Graphing

Graph

$$y = \frac{x-1}{x+1} \quad \text{Take Derivative}$$

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

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

$$0 = \frac{2}{(x+1)^2} \quad \text{Set = Zero}$$

$$0 \neq 2 \quad \text{No CP's}$$

D & R (y, y', y'')

$$x+1 \neq 0$$

$$x \neq -1$$

Critical Value

$$\text{VA } x = -1$$

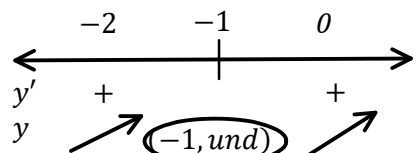
$$x+1 \neq 0$$

$$x \neq -1$$

HA

$$\lim_{x \rightarrow \pm\infty} \frac{1x^1 - 1}{1x^1 + 1} = 1$$

$$\text{HA: } y = \frac{1}{1}$$



$$\text{Inc: } (-\infty, -1) \cup (-1, \infty)$$

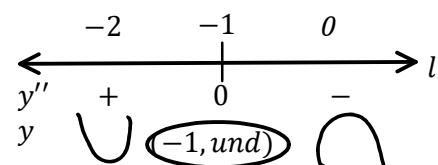
$$y'' = \frac{-4x-4}{(x+1)^4}$$

$$0 = -4x-4$$

$$x = -1$$

Critical Value

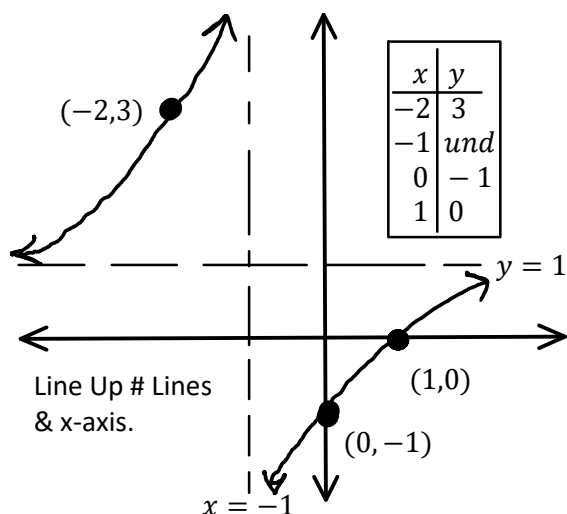
OR UND
Non-Diff Pt



IP

$$\text{Conc Up: } (-\infty, -1)$$

$$\text{Conc Down: } (-1, \infty)$$



Graph

$$y = x\sqrt{4-x}$$

$$y' = 1\sqrt{4-x} - \frac{x}{2\sqrt{4-x}}$$

$$0 = 1\sqrt{4-x} - \frac{x}{2\sqrt{4-x}}$$

$$1\sqrt{4-x} = \frac{x}{2\sqrt{4-x}}$$

$$2(4-x) = x$$

$$8-2x = x$$

$$x = \frac{8}{3}$$

$$y = x\sqrt{4-x}$$

$$y = \frac{8}{3}\sqrt{4-\frac{8}{3}}$$

$$y = \frac{8}{3}\sqrt{\frac{4}{3}}$$

$$y = \frac{16}{3\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$y = \frac{16\sqrt{3}}{9}$$

$$y' = \frac{-3x+8}{2\sqrt{4-x}}$$

$$y'' = \frac{-3(2\sqrt{4-x}) - \frac{-1}{\sqrt{4-x}}(-3x+8)}{4(4-x)}$$

$$y'' = \frac{-6(4-x) + (-3x+8)}{4(4-x)^{3/2}}$$

$$y'' = \frac{3x-16}{4(4-x)^{3/2}}$$

$$0 = 3x-16$$

$$x = \frac{16}{3} = 5.33$$

$$y'' = \frac{3x-16}{4(4-x)^{3/2}}$$

$$y'' = \frac{3(0)-16}{4(4-(0))^{3/2}}$$

$$y'' = -ve$$

$$\text{Conc Down: } (-\infty, 4)$$

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