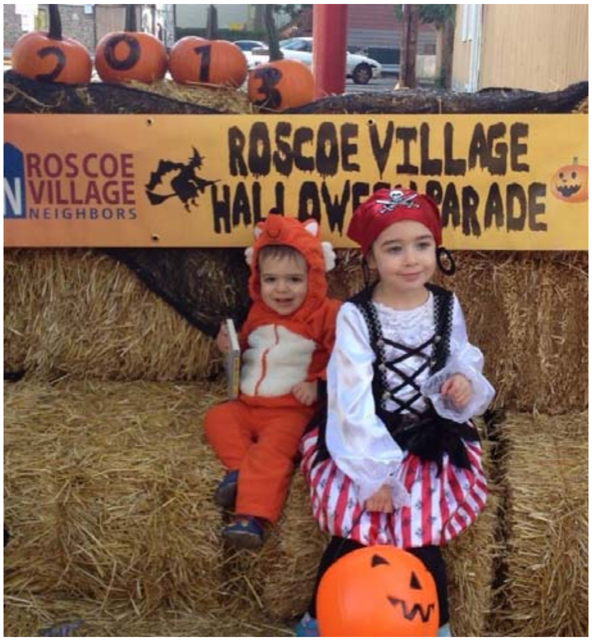

Thursday, October 27, 2016

5.2 - Extreme Values of Functions, Increasing, Decreasing Intervals

Opener — Find and label all extrema.

① $f(x) = \dfrac{x^2}{x+1} \qquad -3 \le x \le 1$

Endpts: $f(-3) = \dfrac{(-3)^2}{-3+1} = -\dfrac{9}{2}$

$f(1) = \dfrac{1^2}{1+1} = \dfrac{1}{2}$

Crit Pts: $f'(x) = \dfrac{(x+1)2x - x^2(1)}{(x+1)^2}$

$f'(x) = \dfrac{2x^2 + 2x - x^2}{(x+1)^2} = \boxed{\dfrac{x^2+2x}{(x+1)^2}}$

Crit pts $f'(x) = 0$ OR $f'(x) = \text{undefined}$

$x^2 + 2x = 0 \qquad (x+1)^2 = 0$

$x(x+2) = 0 \qquad x = -1$

$x = 0, -2$

$f(0) = 0$

$f(-2) = -4$

$f(-1) = \text{undefined}$ (not a max or min)

	x	$f(x)$
Local min	-3	$-\frac{9}{2} = -4.5$
Local max	-2	-4
None	-1	und
Local Min	0	0
Local Max	1	$\frac{1}{2}$

$f'(x)$: -2.5, -1.5, $-.5$, $.5$; Local max, No max min, Local min

$f'(x)$ slope: $[-3$ POS -2 NEG -1 NEG 0 POS $1]$

$f'(x) = \dfrac{x(x+2)}{(x+1)^2}$

5.2 Increasing / Decreasing Intervals

Where is $f(x)$ increasing? Justify your answer.

$[-3,-2] \cup [0,1]$ bc $f'(x) > 0$ on $[-3,-2) \cup (0,1]$

Where is $f(x)$ decreasing? Justify your answer.

$[-2,-1) \cup (-1,0]$ bc $f'(x) < 0$ on $(-2,-1) \cup (-1,0)$

$\boxed{\begin{array}{l} f(x) \text{ is increasing on } [a,b] \text{ if } f'(x) > 0 \text{ on } (a,b) \\ f(x) \text{ is decreasing on } [a,b] \text{ if } f'(x) < 0 \text{ on } (a,b) \end{array}}$