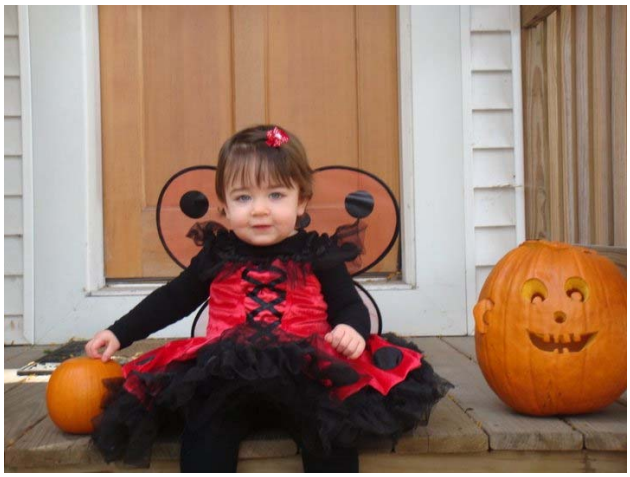

Friday, October 28, 2016

Opener - #1 on Green Sheet

HW Check & Questions

5.2 - Mean Value Theorem

$f(x) = x\sqrt{16-x^2}$ Domain: $[-4, 4]$

$f'(x) = \sqrt{16-x^2} - \frac{x^2}{\sqrt{16-x^2}}$

Critical pts:

f' und: $-4, 4$

$f'(x) = 0$

$\sqrt{16-x^2} - \frac{x^2}{\sqrt{16-x^2}} = 0$

$\sqrt{16-x^2} \cdot \sqrt{16-x^2} = \frac{x^2}{\sqrt{16-x^2}} \cdot \sqrt{16-x^2}$

$16 - x^2 = x^2$

$16 = 2x^2$

$x^2 = 8$

$x = \pm 2\sqrt{2}$

x	f(x)	
-4	0	Local Max
$-2\sqrt{2}$	-8	Abs Min
$2\sqrt{2}$	8	Abs Max
4	0	Local Min

5.2 - Mean Value Theorem

Think about this: A person drives on a tollway. They enter at 4:00 pm and exit at 5:00 pm, having driven 85 miles. The speed limit on the tollway is 65 mph. Although no cop saw them speeding, they receive a ticket in the mail. Is this justified?

Mean Value Theorem

If a function is continuous on $[a, b]$ and differentiable on (a, b) then

$$\frac{f(b) - f(a)}{} = f'(c)$$

$b - a$

average slope between endpts is found at some point in interval.

Example:

(1) $g(x) = 4x^3 - x^2 + 4 \quad [-1, 1]$

(A) Does MVT apply?

- cont. on $[-1, 1]$ ✓
  diff. on $(-1, 1)$ ✓ Yes.

(B) $\dfrac{f(b) - f(a)}{b - a} = f'(c)$

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

$$\frac{7 - (-1)}{2} = 12c^2 - 2c$$

$$\frac{8}{2} =$$

avg slope → $4 = 12c^2 - 2c$ ← derivative

$$0 = 12c^2 - 2c - 4$$

$$0 = 6c^2 - c - 2$$

$$0 = (3c - 2)(2c + 1)$$

$$c = \frac{2}{3}, -\frac{1}{2}$$