Good afternoon: no warm up today;

Reminders:
- No open lunch this Thursday (makeup for missed day)
- first assessment is on Friday

A given differentiable function has critical numbers x=3 and x=2.

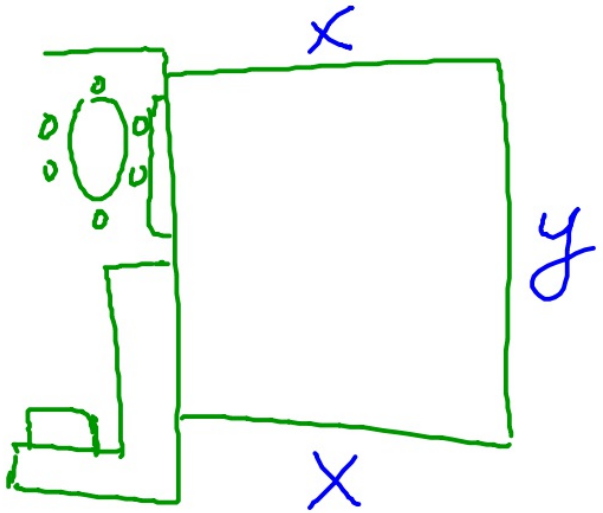
How do you determine which is a maximum? Minimum? What would the case be where a number is a critical number but not a max or min?

Optimization (NOTES)

Using geometry to set up a problem and using calculus to find the maximum or minimum

Identify: geometry of the problem
equation to optimize
constraint(s)

Our rectangular yard needs a fence. We have 500 feet of fencing material and a building is on one side of the yard and so won't need any fencing. What should the dimensions of the fenced yard be to have the maximum area?



$A = x \cdot y$ } optimize

$2x + y = 500$ } constraint

$\S$

$y = 500 - 2x$

$A = x(500 - 2x)$

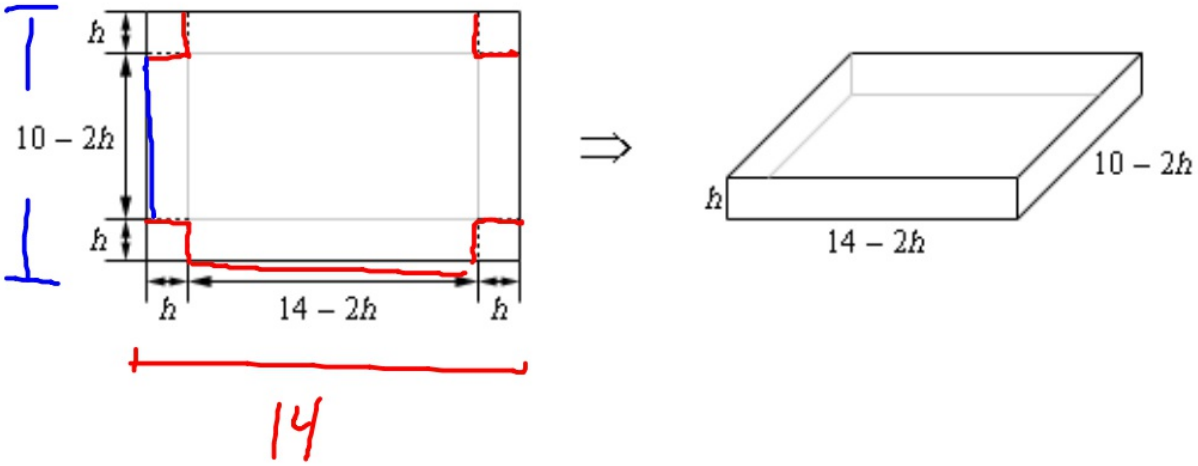
$A = 500x - 2x^2$

$A'(x) = 500 - 4x = 0$

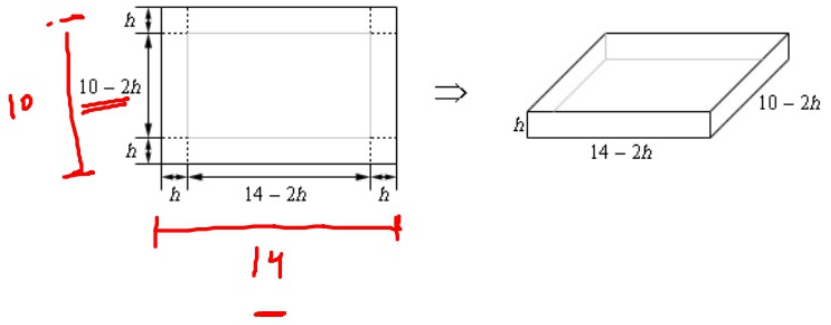
$x = 125$

You have a piece of cardboard that is 14 inches by 10 inches and you're going to cut out the corners as shown below and fold up the sides to form a box, also shown below. Determine the height of the box that will give a maximum volume.

can you visualize this??



$V = l * w * h$ (optimize this)



$V = (14\text{-}2h)(10\text{-}2h)(h)$

$V = (140 - 28h - 20h + 4h^2)(h)$

$V = 140h - 48h^2 + 4h^3$

Find maximum of V: need critical numbers of V, or where V'(h)=0

$V' = 140 - 96\,h + 12h^2 = 0$

$V' = 4(3h^2 - 24h + 35)$

Factor??? It can't be factored :(

Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$h = \frac{24 \pm \sqrt{(-24)^2 - 4(3)(35)}}{2(3)}$

$h = \frac{24 \pm \sqrt{156}}{6}$

$h \approx 1.918, 6.082$

Hw:

p 220 #17-21

come to ds on Thursday plz

↳ Related Rates.