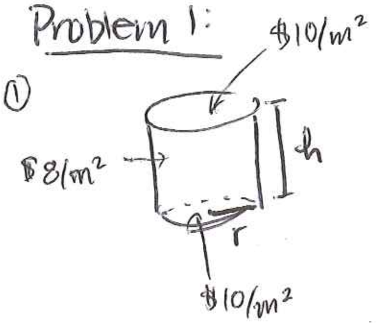
Office hours 2-3 today

2/16/2011

Section 12

Problem 1:



0.) C output, r input

② Easy equation:

C = cost of top/bottom + cost of tube (lateral surface area)

$$= 2(10)(\pi r^2) + (8)(h \cdot 2\pi r)$$

$$C = 20\pi r^2 + 16\pi r h$$

③ Constraint:

$$V = 20\cancel{\pi} = \cancel{\pi} r^2 h$$

$$\frac{20}{r^2} = h$$

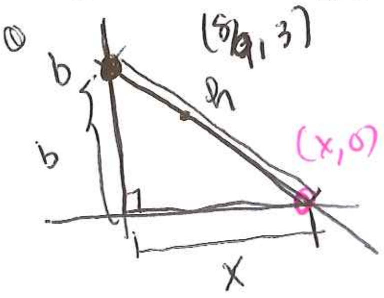
$$\Rightarrow C = 20\pi r^2 + 16\pi \cancel{r}\left(\frac{20}{r^{\cancel{2}}}\right)$$

$$\boxed{C = 20\pi r^2 + \frac{320\pi}{r}}$$

Domain:

④ $0 < r < \infty$

Problem 2:



⓪ out: h

in: x

"Easy"

② $h^2 = b^2 + x^2 = \left(3 - \frac{54}{8-9x}\right)^2 + x^2 = h^2$

Elim/Sub.

③ line: $(\frac{8}{9}, 3)$; $(x, 0)$

1.) Slope: $m = \frac{(3-0)\cdot 9}{(\frac{8}{9} - x)\cdot 9} = \frac{27}{8-9x}$

intercept b: $(8/9, 3)$ and slope

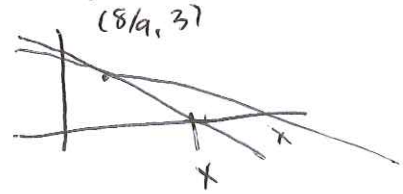
$$3 = \frac{27}{8-9x}\left(\frac{8}{9}\right) + b$$

$$3 - \frac{24}{8-9x} = b$$

$$\Rightarrow h = \sqrt{\left(3-\frac{\cancel{2}4}{8-9x}\right)^2 + x^2}$$

(4) $\frac{8}{9} < x < \infty$

$\uparrow$



Optimization (max/minimizing)

0.) Identify what you are max/min

1.) Find a formula for the quantity in 0.)

Use techniques from previous recipe to find formula in one variable.

2.) Domain?

3.) Use ~~calc~~ Calculator (or if quadratic, find the vertex)

Problem 6: (0) $P = x \cdot y^2 = x(9-x)^2$ (1)

Too many variables!

Constraints: $x, y \geq 0$

$x + y = 9$

$y = 9 - x$

(2) Domain?

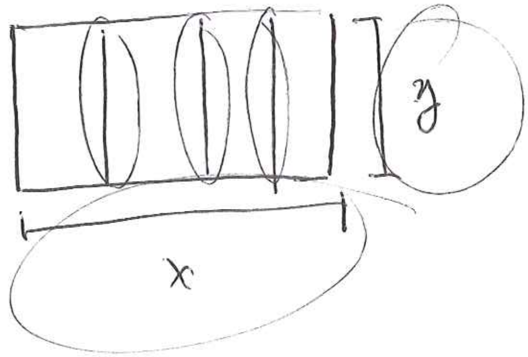
$0 \leq x \leq 9$

(3) Can't use $-b/2a$ not quadratic!

$\Rightarrow$ calculator. $\Longrightarrow$ $x = 3$, $y = 6$.

#7.) ⓪ max area!

①



② Easy formula

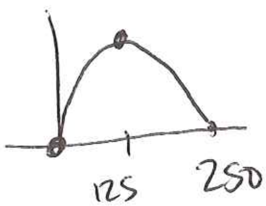
$A = xy = x\left(100 - \frac{2}{5}x\right)$

Extra variables:

Constraint : $500 = 2x + 5y$

$100 - \frac{2}{5}x = y$

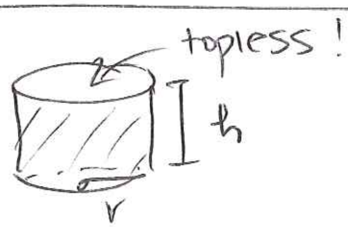
③ D: $0 < x < 250$



$x = 125$ ft

$y = 100 - \frac{2}{5}(125) = 50$ ft

#9.) ①



⓪ maximize ~~cst~~ volume!

② $V = \pi r^2 h$

too many variables:

$3\pi = \pi r^2 + 2\pi r h$