Info...

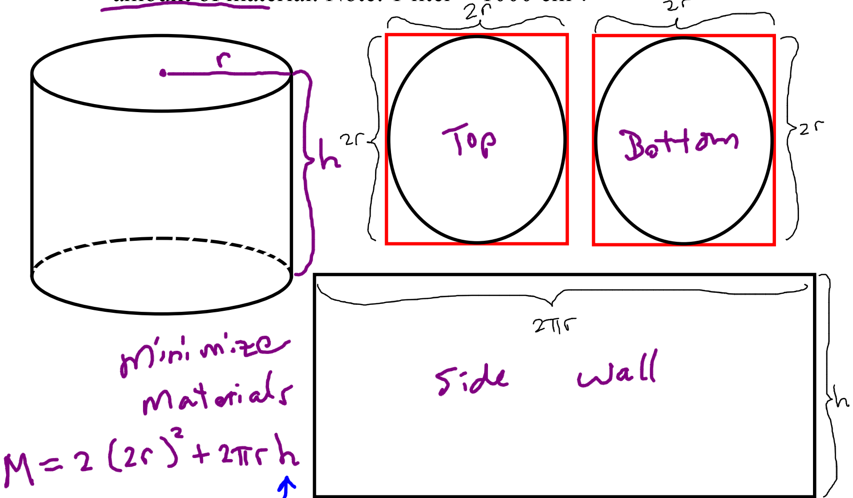
review posted.

- **Test 3** is scheduled for November 1-5. The scheduler opens on October 18th.
- **EMCF**s and **Homework** are posted.
- **Homework** is due today, and an **Online Quiz** is due tonight.

Practice Test 3 on Courseware soon.

Some ***More*** Max/Min Word Problems... (section 4.5)

Example: Many cylindrical containers must be constructed to hold 50 liters. The material for the containers will be cut from rectangular sheets of metal, and any scrap will be recycled, but considered lost to the project. Give the dimensions of the containers that require the least amount of material. Note: 1 liter = 1000 cm^3.



minimize materials

$$M = 2(2r)^2 + 2\pi r h$$

Note: $50{,}000 = \pi r^2 h$ ($50{,}000 \to$ cm^3)

$(50{,}000 \text{ cm}^3 = 50 \text{ liters})$

$$\hookrightarrow h = \frac{50{,}000}{\pi r^2}$$

$$M(r) = 8r^2 + \frac{100{,}000}{r}, \quad 0 < r < \infty$$

We want to minimize this function, and we are NOT in the setting of a closed bounded interval!

$$M'(r) = 16r - \frac{100{,}000}{r^2}, \quad 0 < r < \infty$$

$M'(r)$ exists for all $r > 0$.

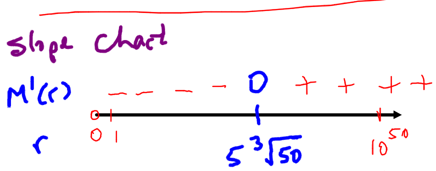
C.n.: set $M'(r) = 0$. $\dfrac{16r^3 - 100{,}000}{r^2} = 0$.

$16r^3 - 100{,}000 = 0$

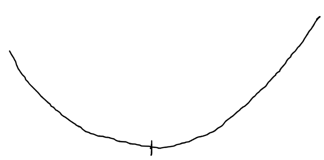
$r = \left(\dfrac{100{,}000}{16}\right)^{1/3} = \dfrac{10\sqrt[3]{100}}{2\sqrt[3]{2}}$

$r = 5\sqrt[3]{50}$

only c.n. for $r > 0$.



$M'(1) = -$ $\quad M'(10^{50}) = +$

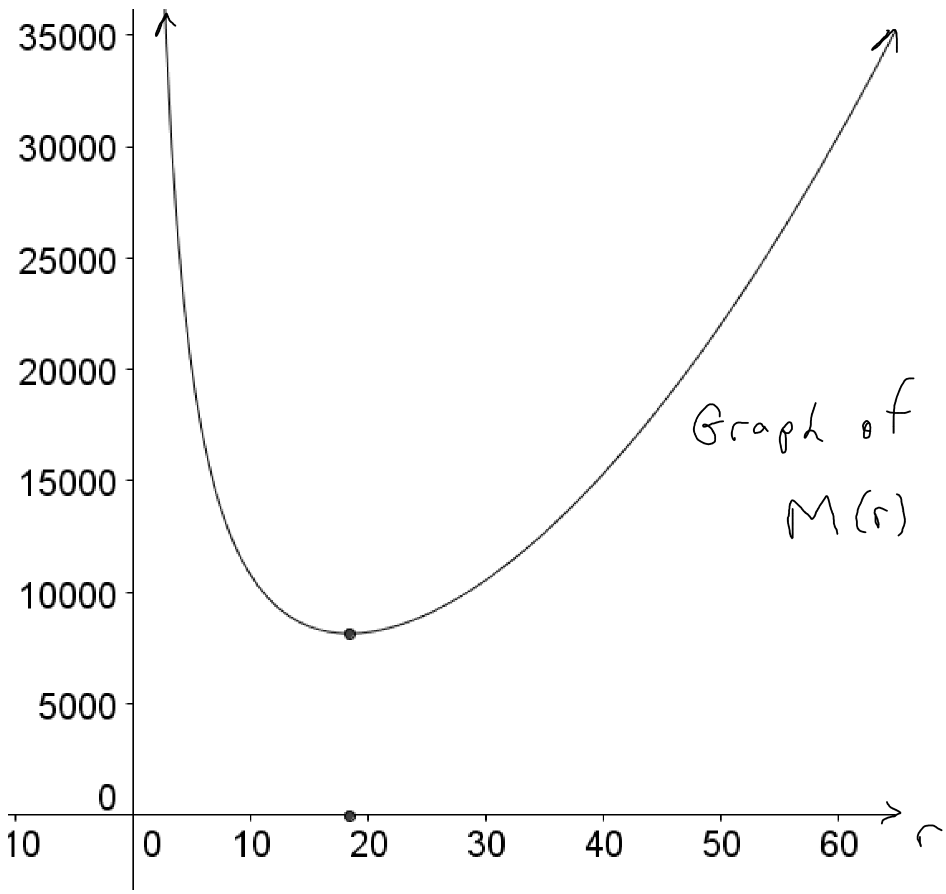


abs. min. at $r = 5\sqrt[3]{50}$.

Dimensions:

$r = 5\sqrt[3]{50}$

$h = \dfrac{50{,}000}{\pi(5\sqrt[3]{50})^2}$


35000
30000
25000
20000
15000
10000
5000
0
10
0
10
20
30
40
50
60
r
Graph of
M(r)

Popper P16

1. Give the maximum value of the function $f(x) = (x+1)^2(x-3)^2$ on the interval $[0,4]$.

2. Give the minimum value of the function $f(x) = (x+1)^2(x-3)^2$ on the interval $[0,4]$.

Example: A box with an open top is to be constructed from a square piece of material that is 48 inches on a side, by cutting equal squares from the corners and turning up the sides. Find the dimensions of the box with the greatest volume.

See the Video