

QUIZ II

(4 pts)

1) You have 3 ft^2 of glow in the dark plastic to make a cylindrical halloween candy bucket. What should the radius be to maximize volume?

$$V = \pi r^2 h$$

$$SA = 2\pi r h + \pi r^2 \quad (\text{open top cylinder})$$



2. Maximize $V = \pi r^2 h$

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

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

$$h = \frac{3 - \pi r^2}{2\pi r}$$

4. $V = \pi r^2 \left(\frac{3 - \pi r^2}{2\pi r} \right) = r \left(\frac{3 - \pi r^2}{2} \right)$
 $= \frac{1}{2} (3r - \pi r^3)$

5. $V' = \frac{1}{2} (3 - 3\pi r^2) \stackrel{\text{SET}}{=} 0$

$$3 = 3\pi r^2 \Rightarrow r^2 = \frac{1}{\pi}, \quad r = \sqrt{\frac{1}{\pi}}$$

$$V'' = -6\pi < 0 \Rightarrow \text{concave down, max } \checkmark$$

(2 pts)

2) Do you find the warmup problems useful?