

1-5 Homework: p. 41, # 1-10



calc window: $[-3000, 10,000] \times [-1000, 1,200,000]$
 max @ (750, 1125000)

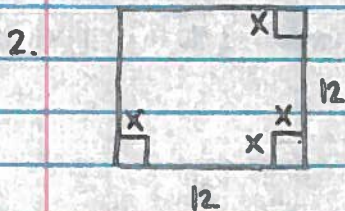
$$P = 2w + l = 3000 \quad A = lw$$

$$l = 3000 - 2w \quad A = w(3000 - 2w)$$

$$l = 1500 \quad A = 3000w - 2w^2$$

$$w = 750$$

dimensions: 1500 yd x 750 yd
 max area = 1,125,000 yd²



domain: $x \in [0, 6]$
 window: $[-10, 10] \times [-100, 500]$

max @ (2, 128)

square: 2 in x 2 in

$$V = l \cdot w \cdot h$$

$$V = (12 - 2x)(12 - 2x)x$$

$$V = (144 - 48x + 4x^2)x$$

$$V = 4x^3 - 48x^2 + 144x$$

3. $108 = 2\pi r + l$, where $l = h$
 $l = 108 - 2\pi r$

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

$$V = \pi r^2 (108 - 2\pi r)$$

$$V = 108\pi r^2 - 2\pi^2 r^3$$

$$V = 339.292r^2 - 19.739r^3$$

window: $[-20, 20] \times [-150, 15,000]$
 max @ (11.459, 14851.066)

dimensions: 11.459 in x 36 in
 max volume = 14,851 in³

$$r = 11.459$$

$$l = 36$$

4. Moon: $s = 832t - 2.6t^2$
 $0 = t(832 - 2.6t)$
 $t = 0, 320 \text{ sec}$

$$0 = -2.6(t^2 - 320t + 25600) - (-66560)$$

$$= -2.6(t - 160)^2 + 66560$$

max height = 66,560 ft

(160, 66560) ← window: $[-500, 500] \times [-500, 100,000]$

Earth: $s = 832t - 16t^2$
 $0 = t(832 - 16t)$
 $t = 0, 52 \text{ sec}$

$$0 = -16(t^2 - 52t + 676) - (-10816)$$

$$0 = -16(t - 26)^2 + 10816$$

max height = 10,816

(26, 10816) ← window:

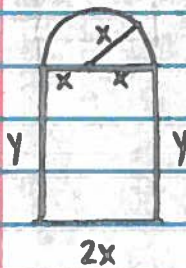
$[-100, 300] \times [-100, 15000]$

5. $A = lw = 16$ $P = 2l + 2w$ window: $[-20, 20] \times [-20, 20]$
 $l = \frac{16}{w}$ $P = 2\left(\frac{16}{w}\right) + 2w$ min @ $(4, 16)$ $w=4$
 $l = \frac{16}{4} = 4$ $P = \frac{32 + 2w}{w}$ **min perimeter = 16 cm**
 $P = \frac{32 + 2(4)}{4} = \frac{8 + 8}{4} = 16$

6. $D = x - x^3$; domain: $x \in [0, 1]$ window: $[-5, 5] \times [-10, 10]$
max @ $(0.577, 0.385)$
 $x = 0.577$

7. $V = 32x = \pi r^2 h$ $SA = 2\pi r^2 + 2\pi r h$ window: $[-10, 10] \times [-100, 200]$
 $h = \frac{32}{r^2}$ $SA = 2\pi r^2 + 2\pi r \left(\frac{32}{r^2}\right)$
 $SA = 2\pi r^2 + \frac{64\pi}{r}$
min @ $(2.520, 119.687)$
 $r = 2.520$
min SA = 119.687 m²

8.



$P = 2x + 2y$ $20 = 2x + 2y + \pi x$
 $C = \frac{1}{2}(2\pi)$ $y = \frac{20 - 2x - \pi x}{2}$; $y = 10 - x - \frac{\pi x}{2}$

$A = 2xy$ $A = 2xy + \frac{1}{2}\pi x^2$
 $A = \frac{1}{2}\pi x^2$ $A = 2x(10 - x - \frac{\pi x}{2}) + \frac{\pi x^2}{2}$

$A = 20x - 2x^2 - \pi x^2 + \frac{\pi x^2}{2}$

$A = 20x - 2x^2 - \pi x^2 + \frac{\pi x^2}{2}$

window: $[-10, 10] \times [-100, 200]$

max @ $(2.8, 28.005)$

max A = 28.005'