

### HW 3.7B

6) Prim:  $S = x + 3y$        $S = 192y^{-1} + 3y$        $-\frac{192}{y^2} + 3 = 0$   
 Sec:  $xy = 192$        $S' = -\frac{192}{y^2} + 3$        $3 = \frac{192}{y^2}$   
 $x = \frac{192}{y}$        $3y^2 = 192$   
 Dom:  $x > 0$        $x = \frac{192}{8} = 24$        $y^2 = 64$   
 $y > 0$        $y = 8$        $y = 8$   
 $S'(1) \downarrow \quad S'(10) \uparrow$  Min.

7) Prim:  $SA = s^2 + 4sh$        $SA = s^2 + 4s(\frac{32}{s^2})$        $2s - \frac{128}{s^2} = 0$   
 Sec:  $V = s^2h = 32$        $= s^2 + 128s^{-1}$        $2s = \frac{128}{s^2}$   
 $h = \frac{32}{s^2}$        $SA' = 2s - \frac{128}{s^2}$        $2s^3 = 128$   
 $h = \frac{32}{4^2} = 2$        $s^3 = 64$        $s = 4$        $SA'(1) \downarrow \quad SA'(5) \uparrow$  Min.

8) Prim:  $A = (l+8)(w+4)$        $A = (\frac{50}{w} + 8)(w+4)$        $-\frac{200}{w^2} + 8 = 0$   
 Sec:  $PA = lw = 50$        $= 50 + 200w^{-1} + 8w + 32$        $8 = \frac{200}{w^2}$   
 $l = \frac{50}{w}$        $A' = -\frac{200}{w^2} + 8$        $8w^2 = 200$   
 Dom:  $0 < l < 50$        $w^2 = 25$        $w = 5$   
 $0 < w < 50$        $l = \frac{50}{5} = 10$        $l = 18 \text{ in } w = 9 \text{ in}$        $A'(1) \downarrow \quad A'(6) \uparrow$  Min.

9) Prim:  $P = xy$        $P = (24-2y)y$        $24-4y = 0$        $P'(1) \uparrow \quad P'(7) \downarrow$   
 Sec:  $x+2y = 24$        $= 24y - 2y^2$        $4y = 24$        $\text{Max}$   
 $x = 24-2y$        $P' = 24-4y$        $y = 6$   
 $x = 24-2(6) = 12$   
 $x = 12 \quad y = 6$

10) Garage Prim:  $A = lw$        $A = l(50-3l)$        $50-6l = 0$   
 Sec:  $w+3l = 50$        $= 50l - 3l^2$        $6l = 50$   
 $w = 50-3l$        $A' = 50-6l$        $l = \frac{25}{3}$   
 $w = 50-3(\frac{25}{3}) = 25$        $l = \frac{25}{3} \text{ ft}$        $w = 25 \text{ ft}$        $A'(8) \uparrow \quad A'(10) \downarrow$  Max