Solutions to Selected Problems

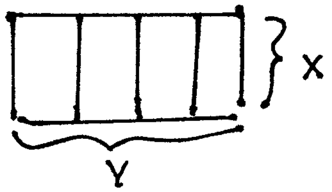
(8) SA cube = area of six sides $S = 6x^2$ Need in terms of V so get x in terms of V. Know $V = x^3$ so $x = \sqrt[3]{V}$ $S = 6(\sqrt[3]{V})^2 = 6V^{2/3}$

(18) $V_{cone} = \frac{1}{3}\pi r^2 h = 100$. solve for h, $h = \frac{300}{\pi r^2}$

(22) Maximize $A_{rect} = xy$ Need y in terms of x. Given $P = 20$ so $2x + 2y = 20 \Rightarrow y = 10 - x$

$A = x(10 - x)$
$A = 10x - x^2$
Max at Vertex $x = \frac{-10}{2(-1)} = 5$
Dimensions: $x = 5$ ft, $y = 5$ ft

(24)



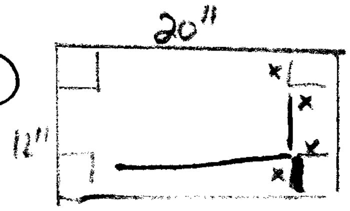
Maximize Area $= xy$ Need y in terms of x. Know 750 ft of fencing so $5x + 2y = 750 \Rightarrow y = -\frac{5}{2}x + 375$

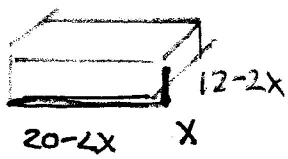
So $A = x\left(-\frac{5}{2}x + 375\right) = -\frac{5}{2}x^2 + 375x$

So max when $x = \frac{-b}{2a} = \frac{-375}{2(-5/2)} = 75$ ft.

Max area $A = -\frac{5}{2}(75)^2 + 375(75) = 140{,}625$ ft^2

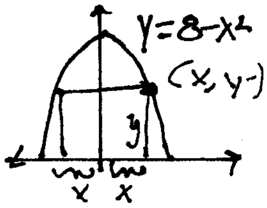
(30)





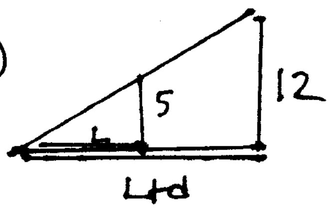
$V = lwh = (20-2x)(12-2x)x$
$V = 240x - 64x^2 + 4x^3$
Since not quadratic, use computer graph to maximize.

(32)



Maximize Area rectangle $A = lw$
$A = 2xy$ need y in terms of x. Given point on $y = 8 - x^2$
$A = 2x(8 - x^2)$
$A = 16x - 2x^3$
Not Quadratic - use computer graph

(12)



Relate L and D. Similar triangles $\frac{\text{small triangle}}{\text{BIG triangle}}$ $\frac{L}{L+d}$ $\frac{5}{12}$

$L = \frac{50}{7}$ ← Solve for L $12L = 5(L+D)$
$12L = 5L + 50$
$7L = 50$