4.4 PARTIAL SOLUTIONS

(1) a) x = ONE #

$20-x$ = 2nd #

MAX/MIN:

$S(x) = x^2 + (20-x)^2$

MAX. SUM IS 400 WHEN THE 2 #'S ARE 0 & 20

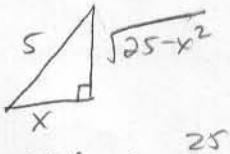
MIN SUM IS 200 WHEN THE 2 #'S ARE 10 & 10

b) MAX/MIN: $Q(x) = \sqrt{x} + (20-x)$

MAX SUM IS $20\frac{1}{4}$ WHEN THE 2 #'S ARE $19\frac{3}{4}$ AND $\frac{1}{4}$

MIN SUM IS $\sqrt{20}$ WHEN THE 2 #'S ARE 0 & 20

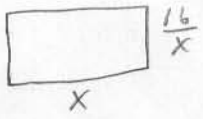
(2)



MAX: $A(x) = \frac{1}{2} x\sqrt{25-x^2}$

MAX AREA IS $\frac{25}{4}$ SQ. cm WHEN THE BASE = HEIGHT = $\frac{5\sqrt{2}}{2}$ cm

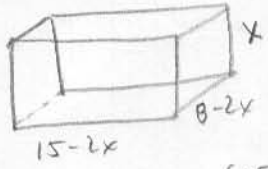
(3)



MIN: $P(x) = 2x + 2\left(\frac{16}{x}\right)$

MIN. PERIMETER = 16in WHEN THE DIMENSIONS ARE 4in BY 4in.

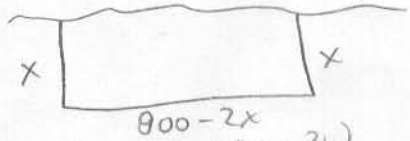
(7)



MAX: $V(x) = x(15-2x)(8-2x)$

MAX VOLUME IS $\frac{2450}{27} \approx 90.741$ CU. UNITS WHEN THE DIMENSIONS ARE $\frac{5}{3}, \frac{14}{3}, \frac{35}{3}$ UNITS

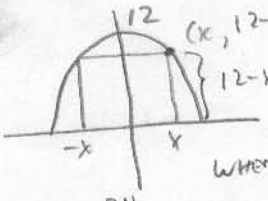
(9)



MAX: $A(x) = x(800-2x)$

MAX AREA IS 80,000 m^2 WHEN THE DIMENSIONS ARE 200m BY 400m

(6)

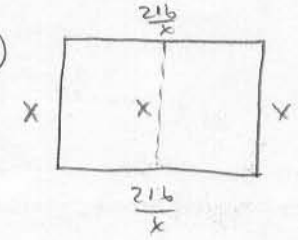


MAX:

$A(x) = 2x(12-x^2)$

MAX AREA IS 32 SQ. UNITS WHEN THE DIMENSIONS ARE 4 BY 8 UNITS

(10)

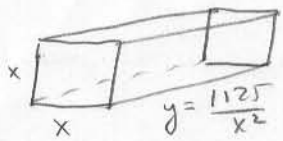


MIN:

$P(x) = 3x + 2 \cdot \frac{216}{x}$

MIN. AMOUNT OF FENCE NEEDED IS 72m WHEN THE DIMENSIONS OF THE FIELD ARE 12m BY 18m

(12)



MIN: $C(x) = 5x^2 + \frac{33,750}{x}$

a) MINIMUM COST OCCURS WHEN $x = 15$ ft. & $y = 5$ ft

*b) DISCUSS IN CLASS

(31) MAX: $V(x) = \pi x^2 + \frac{\pi}{3} x^2 \cdot \sqrt{9-x^2}$

TOUGH THIS WAY. INSTEAD REPRESENT V IN TERMS OF y:

$V(y) = \frac{1}{3}\pi(9-y^2)(3+y)$

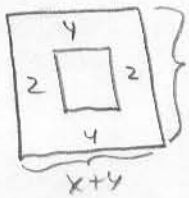
MAX. VOLUME IS $\frac{32}{3}\pi$ CUBIC UNITS WHEN $x = 2\sqrt{2}$ AND $y = 1$

(33) a) $S = k \cdot w \cdot d^3$, k IS A POSITIVE CONSTANT

MAX: $S(d) = k \cdot \sqrt{144-d^2} \cdot d^3$

THE MAX. STIFFNESS OCCURS WHEN $w = 6$ in AND $d = 6\sqrt{3}$ in

(13)



MIN. $T(x) = (x+4)\left(\frac{50}{x} + 8\right)$

MIN AMOUNT OF PAPER OCCURS WHEN THE DIMENSIONS ARE 18in BY 9in