4.4 PARTIAL SOLUTIONS

(16) MIN: $S(r) = \pi r^2 + \frac{2000}{r}$

THE LIGHTEST CAN HAS DIMENSIONS

$r = h = \frac{10}{\sqrt[3]{\pi}} \doteq 6.828$ cm

(20) MIN: $T(x) = \frac{1}{2}\sqrt{4+x^2} + \frac{1}{5}(6-x)$

JANE SHOULD LAND HER BOAT .873 MILES DOWN THE SHORELINE FROM THE POINT NEAREST HER BOAT. THE MINIMUM TIME IS 2.117 HRS.

(25) MAX: $V(x) = x^2(108-4x)$

THE MAX VOLUME IS 11,664 in^3 WHEN THE DIMENSIONS ARE 18in BY 18in BY 36in

(36) MIN: $d(x) = \sqrt{(x-\frac{3}{2})^2 + (x-0)^2}$

OR MIN $D(x) = x^2 - 2x + \frac{9}{4}$ WHERE $D = d^2$.

MIN DISTANCE IS $\frac{\sqrt{5}}{2}$ UNITS AT $x = 1$.

(14) $v(t) = A'(t) = -32t + 96$

a) $v = 96 \frac{ft}{sec}$

b) MAX HT IS 256 ft WHEN $t = 3$ sec

c) $v(t=7) = -128 \frac{ft}{sec}$

(18) a) $V(x) = x(10-2x)\left(\frac{15-2x}{2}\right)$

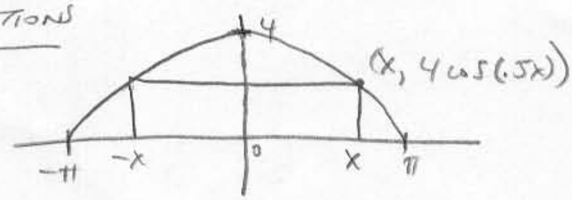
b) $0 < x < 5$

d) $V'(x) = 6x^2 - 50x + 75$

$V'(x) = 0$ AT $x \doteq 1.962$

MAX VOLUME IS $66.019 in^3$ WHEN THE DIMENSIONS ARE 1.962 in BY 6.076in BY 5.538 in

(21)



MAX: $A(x) = 2x(4\cos(.5x))$

MAX. AREA $\doteq$ 8.977 SQ. UNITS WHEN THE DIMENSIONS ARE 3.442 BY 2.60 UNITS

(26) a) MAX: $V(x) = \pi\left(\frac{x}{2\pi}\right)^2(18-x)$

or $V(x) = \frac{9x^2}{2\pi} - \frac{x^3}{4\pi}$

MAX. VOLUME IS $\frac{216}{\pi}$ cm^3 WHEN

$x = 12cm$, $y = 6cm$, $r = \frac{6}{\pi}$ cm

b) MAX: $V(x) = 18\pi x^2 - \pi x^3$

HEY! THIS HAS THE SAME ANSWER AS PART(

(35) MAX CURRENT IS $2\sqrt{2}$ AMPS AND IT OCCURS WHEN $t = \frac{\pi}{4}$ sec.

(15) NOTE: YOU MUST REALIZE THAT a & b ARE NOT VARIABLES; THEY ARE CONSTANTS (NUMBE

MAX $A(\theta) = \underbrace{\left(\frac{1}{2}a \cdot b\right)}_{\text{A CONSTANT}} \cdot \sin\theta$

MAX AREA OCCURS WHEN $\theta = 90°$ or $\frac{\pi}{2}$.

(17) MIN: $A(r) = 8r^2 + \frac{2000}{r}$

$r = 5$; $h = \frac{40}{\pi}$ $\therefore$ $\frac{h}{r} = \frac{8}{\pi}$

(22) MAX: $V(x) = 2\pi(100-x^2) \cdot x = 200\pi x - 2\pi x^3$

MAX VOLUME IS $\doteq 2418.399$ cm^3 WHEN $r \doteq 8.165$ cm AND $h \doteq 11.547$ cm

(27) MAX: $V(r) = \frac{1}{3}\pi r^2\sqrt{3-r^2}$

MAX VOLUME IS $\frac{2\pi}{3}$ m^3 WHEN $r = \sqrt{2}$ m; $h = 1$m

(37) MIN: $d(x) = \sqrt{(x-1)^2 + (\sqrt{16-x^2} - \sqrt{3})^2}$

OR MIN: $D(x) = -2x + 20 - 2\sqrt{48-3x^2}$

WHERE $D = d^2$

MIN DIST = 2 WHEN $x = 2$