ASSIGNMENT #3
943-DW
FALL 2011
SOLUTIONS

SECTION 4.3

#18 $\csc(22.81°)$

$= \frac{1}{\sin 22.81°} = \boxed{2.58}$

#50 $\sin\theta = 0.6725$

$\theta = \sin^{-1}(0.6725)$

$= \boxed{42.26°}$

$\cos(42.26°) = \boxed{0.74}$

#51 $\sec\theta = 1.3698$

$\cos\theta = \frac{1}{1.3698}$

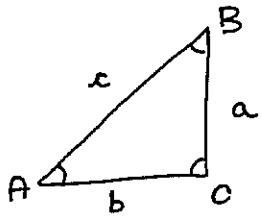
$\theta = \cos^{-1}\left(\frac{1}{1.3698}\right)$

$= 43.11°$

$\tan 43.11° = \boxed{0.94}$

SECTION 4.4

#16



$a = 5920$

$b = 4110$

$a^2 + b^2 = c^2$

$\boxed{c = 7206.84}$

$\tan A = a/b$

$A = \tan^{-1}\left(\frac{5920}{4110}\right) = \boxed{55.23°}$

$B = \boxed{34.77°}$

$C = 90°$

#18 ANSWERS

$a = 17.98$

$b = 4.01$

$c = 18.42$

$A = 77.4°$

$B = 12.6°$

#20 ANSWERS

$a = 9.908$

$b = 7.83$

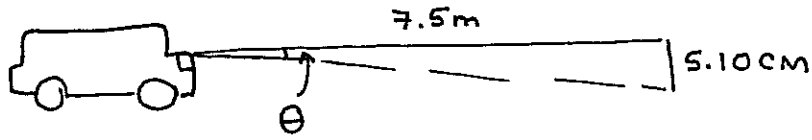
$c = 12.63$

$A = 51.68°$

$B = 38.32°$

Section 4.5

7

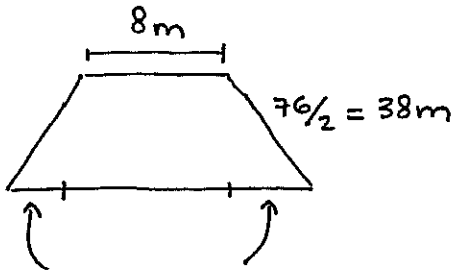


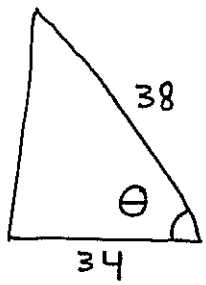
$$\tan\theta = \frac{5.10}{750}$$

$$\theta = \tan^{-1}\left(\frac{5.10}{750}\right)$$

$$= \boxed{0.39^\circ}$$

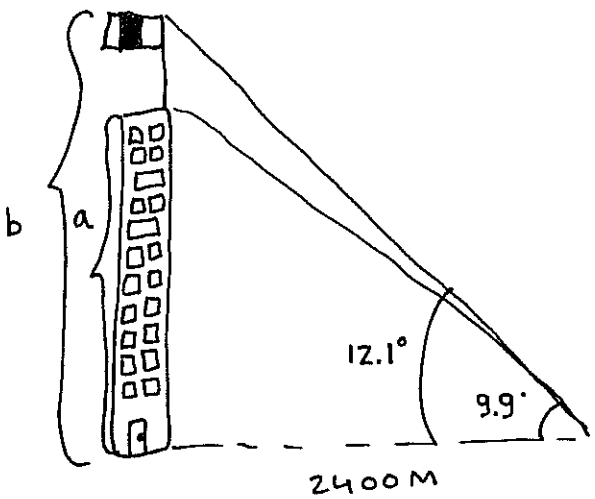
22





$$\cos\theta = \frac{34}{38} \longrightarrow \boxed{\theta = 26.53^\circ}$$

32



$$\tan 9.9^\circ = \frac{a}{2400}$$

$$a = 418.87\text{m}$$

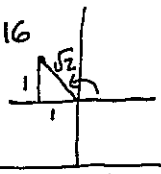
$$\tan 12.1^\circ = \frac{b}{2400}$$

$$b = 514.52\text{m}$$

$$\text{FLAG POLE} = a - b = \boxed{95.65\text{m}}$$

SECTION 8.1

#16

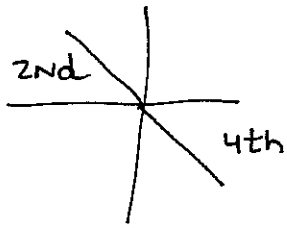


$\sin\theta = 1/\sqrt{2}$

$\cos\theta = -1/\sqrt{2}$

$\tan\theta = -1$

#28 $\tan\theta = -0.75$

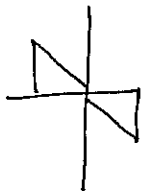


#30 **3rd**

#38 **4th**

SECTION 8.2

#28 $\tan\theta = -1.830$



$\theta_1 = -61.35°$

$= \boxed{298.65°}$

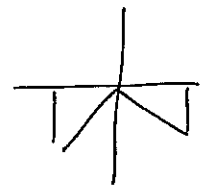
$\theta_2 = 180° - 61.35°$

$= \boxed{118.65°}$

#30 $\theta_1 = 39.6°$, $\theta_2 = 140.4°$

#32 $\csc\theta = -8.09$ sin is < 0

$\sin\theta = \frac{1}{-8.09}$



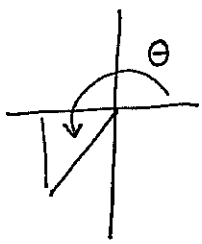
$\theta_1 = -7.1°$

$= \boxed{352.9°}$

$\theta_2 = 180 + 7.1°$

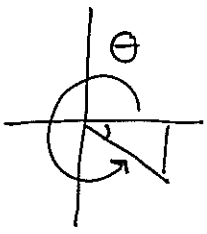
$= \boxed{187.1°}$

#34 $\tan\theta = 0.932$, $\sin\theta < 0$



$\boxed{\theta = 222.98°}$

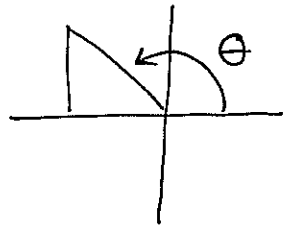
#38 $\cos\theta = 0.0726$ $\sin\theta < 0$



$\boxed{\theta = 274.16°}$

#40 $\cot\theta = -0.3256$

$\csc\theta > 0$



$\boxed{\theta = 108.04°}$

SECTION 8.3

#14 $\frac{3\pi}{10} = \frac{3\pi}{10} \cdot \frac{180}{\pi} = \boxed{54°}$

$\frac{5\pi}{6} = \frac{5\pi}{6} \cdot \frac{180}{\pi} = \boxed{150°}$

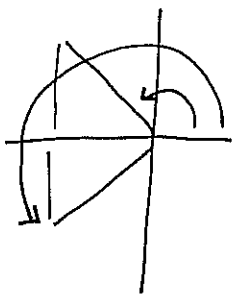
#15 $\boxed{10°, 31.5°}$

#22 0.3π or 0.95

#24 0.58π or 1.82

#26 0.94π or 2.94

#54 $\cos\theta = -0.9135$

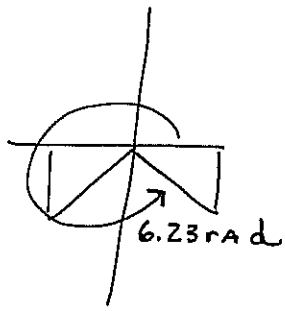


$\theta = 2.72$ rad

$\theta_2 = 2\pi - 2.72$ rad

$= \boxed{3.56 \text{ rad}}$

#56 $\sin\theta = -0.0436$



$\theta = -0.0436$

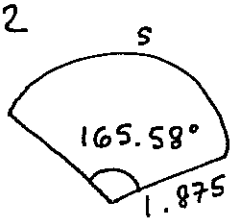
$= \boxed{6.23 \text{ rad}}$

$\theta_2 = \pi + 0.0436$

$= \boxed{3.185 \text{ rad}}$

SECTION 8.4

#22



$\theta = 165.58° \cdot \frac{\pi}{180°}$

$= 2.89$

$S = \theta r$

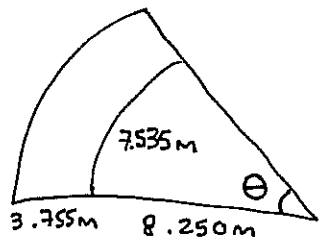
$= (2.89)(1.875)$

$= 5.42\text{cm}$

Perimeter $= 5.42 + 2(1.875)$

$= \boxed{9.17\text{cm}}$

#27



$\theta = s/r = \frac{7.535}{8.25} = 0.9133$

$A_L = \frac{1}{2}\theta r^2$

$= \frac{1}{2}(0.91)(8.25+3.755)^2$

$= 65.81 \text{ m}$

$A_S = \frac{1}{2}\theta r^2$

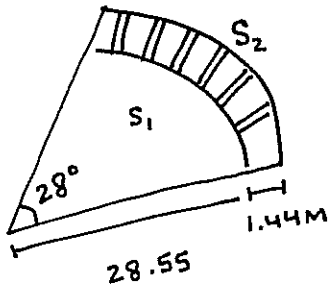
$= \frac{1}{2}(0.9133)(8.25)^2$

$= 31.08 \text{ m}^2$

Shaded area $= 65.8124 - 31.08$

$= \boxed{34.73 \text{m}^2}$

#29



$28° = 0.489 \text{ rad}$

$S_1 = \theta r_1$
$= 0.489(28.55)$
$= 13.95 \text{ m}$

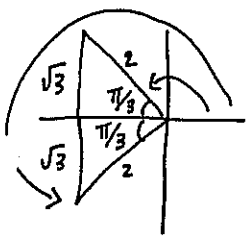
$S_2 = \theta(r_1 + 1.44)$
$= 0.489(29.99)$
$= 14.66 \text{ m}$

Difference: $S_2 - S_1 = \boxed{0.704 \text{ m}}$

Section 20.5

#6 $2\cos x + 1 = 0$

$\cos x = -1/2$



$x_1 = \pi - \pi/3 = \boxed{2\pi/3}$

$x_2 = \pi + \pi/3 = \boxed{4\pi/3}$

#9 $4\cos^2 x - 1 = 0$

$\cos^2 x = 1/4$

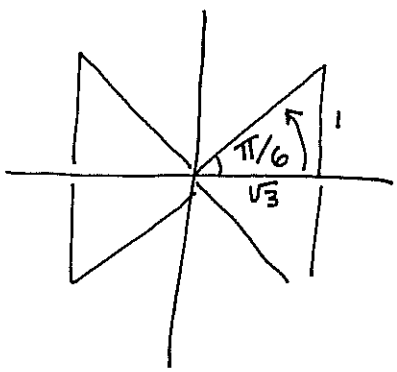
$\cos x = \pm 1/2$

$x = \boxed{\pi/3, 2\pi/3, 4\pi/3, 5\pi/3}$

#10 $3\tan^2 x - 1 = 0$

$\tan^2 x = 1/3$

$\tan x = \pm \frac{1}{\sqrt{3}}$



$x = \boxed{\pi/6, 5\pi/6, 7\pi/6, 11\pi/6}$

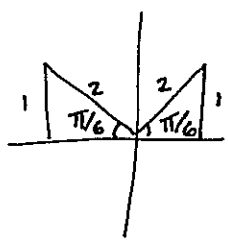
#11 $2\sin^2 x - \sin x = 0$

$\sin x(2\sin x - 1) = 0$

$\sin x = 0$ or $\sin x = 1/2$

$x = 0, \pi$

$x = \boxed{0, \pi, \pi/6, 5\pi/6}$



SECTION 12.1

#18 a. $\sqrt{(-15)^2} = \boxed{15}$

b. $(\sqrt{-15})^2 = (\sqrt{15}j)^2$

$= 15j^2$

$= \boxed{-15}$

#28 $2j^5 - \frac{1}{j^{-2}}$

$= 2j - j^2$

$= \boxed{1 + 2j}$

#31 $-\sqrt{(-j)^2}$

$= -\sqrt{j^2}$

$= \boxed{-j}$

#32 $-\sqrt{-j^2}$

$= -\sqrt{-1}\ \sqrt{j^2}$

$= -\sqrt{1}$

$= -$

$= \boxed{-1}$

#40 $j^3 - 6$

$= -j - 6$

$= \boxed{-6 - j}$

#43 $(\sqrt{-2})^2 + j^4$

$= (\sqrt{-1}\sqrt{2})^2 + 1$

$= j^2 \cdot 2 + 1$

$= -2 + 1 = \boxed{-1}$

SECTION 12.2

#14 $(-2.2j)(1.5j - 4)$

$= -3.3j^2 + 8.8j$

$= \boxed{3.3 + 8.8j}$

#18 $\sqrt{-6}\sqrt{-12}\sqrt{30}$

$= \sqrt{6}j\sqrt{12}j\sqrt{30}$

$= \sqrt{6}\, j\sqrt{2}\sqrt{6}\, j\sqrt{5}\sqrt{6}$

$= \boxed{-12\sqrt{15}}$

#22 $j^2\sqrt{-7} - \sqrt{-28} + 8$

$= -\sqrt{7}j - \sqrt{28}j + 8$

$= -\sqrt{7}j - 2\sqrt{7}j + 8$

$= \boxed{8 - 3\sqrt{7}j}$

#24 $(8j+20)(8j+20)$

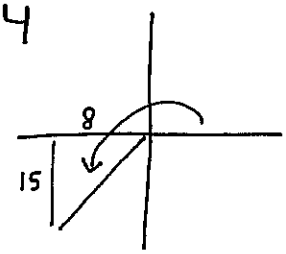
$= \boxed{336+320j}$

#30 $\boxed{-\frac{2}{25}+\frac{39}{25}j}$

#36 $\boxed{\frac{77}{221}-\frac{359}{221}j}$

SECTION 12.4

#4



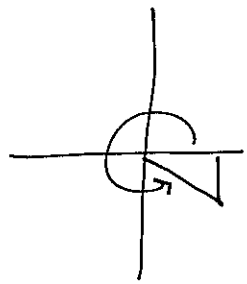
$-8-15j$

$= \boxed{17\angle 241.93°}$

#10 $460-460j$

$= 460\sqrt{2}\angle 315°$

$\approx \boxed{650.5\angle 315°}$



#12 $\sqrt{2}-\sqrt{2}j$

$= \boxed{2\angle 315°}$

#19 $\boxed{2.94+4.05j}$

#22 $\boxed{1.77-1.77j}$

SECTION 12.5

#8 $r = 2.1$

$\theta = 10.2748$

$\boxed{2.1e^{10.27j}}$

#18 $-1-5j$

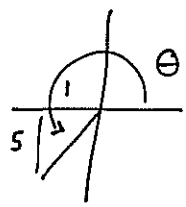
$\theta = 180° + 78.69°$

$= 258.69°$

$= 4.51$

$r = \sqrt{26}$

$\boxed{\sqrt{26}e^{4.51j}}$



#20 $\boxed{608.28e^{0.17j}}$

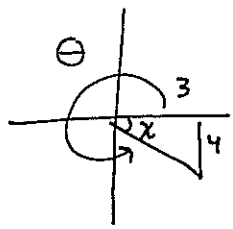
#28 $\boxed{-1.9 - 1.6j}$

#30 $\boxed{-0.79 + 0.11j}$

SECTION 12.6

#39 $\sqrt[3]{3-4j}$

$3-4j$



$r^2 = 3^2+4^2$

$r = 5$

$x = \tan^{-1}(4/3)$

$= 53.13°$

$\theta_1 = 360° - 53.13°$ $\quad \theta_2 = 666.87°$ $\quad \theta_3 = 1026.87°$

$= 306.87°$ $\quad = 11.64 \text{ rad}$ $\quad = 17.93 \text{ rad}$

$= 5.36 \text{ rad}$

- $(3-4j)^{1/3} = (5e^{5.36j})^{1/3}$

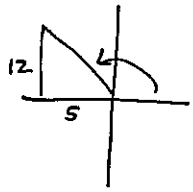
$= \sqrt[3]{5}\cos(1.787) + \sqrt[3]{5}\sin(1.787)j$

$= \boxed{-0.36 + 1.67j}$

- $(5e^{11.64j})^{1/3} = \boxed{-1.23 - 1.12j}$

- $(5e^{17.93j})^{1/3} = \boxed{1.59 - 0.5j}$

#40 $-5+12j$



$r = 13$

$\theta_1 = 112.6^\circ = 1.97$

$\theta_2 = 472.6^\circ = 8.25$

$$\sqrt{-5+12j} = (13e^{1.97j})^{1/2}$$
$$= 3.6e^{0.99j}$$
$$= 3.6\cos 0.99 + 3.6\sin 0.99\, j$$
$$= \boxed{2+3j}$$

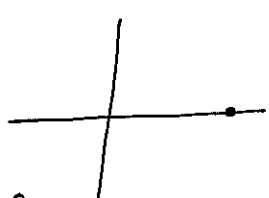
$\theta_2 \longrightarrow \boxed{-2-3j}$

check: $(2+3j)(2+3j) = 4+12j+9j^2$
$= -5+12j$ ✓

$(-2-3j)(-2-3j) = 4+12j+9j^2$
$= -5+12j$ ✓

#44 $x^3 = 8$

$x = \sqrt[3]{8}$



$r = 8$

$\theta = 0^\circ, 360^\circ, 720^\circ$

$0, 2\pi, 4\pi$

$x_1 = (8e^{0j})^{1/3}$
$= 2e^{0j}$
$= \boxed{2}$

$x_2 = (8e^{2\pi j})^{1/3}$
$= 2e^{2\pi/3 j}$
$= 2(-1/2) + 2\sqrt{3}/2\, j$
$= \boxed{-1+\sqrt{3}j}$

$x_3 = (8e^{4\pi j})^{1/3}$
$= 2e^{4\pi/3 j}$
$= 2(-1/2) + 2(-\sqrt{3}/2)j$
$= \boxed{-1-\sqrt{3}j}$