Math 61

HOMEWORK # 4 – SOLUTIONS

SECTION 2.1

#14 if 2 parallel lines are cut by a trans., then the exterior $\angle$'s on the same side of the trans. are supplementary.

$(4x+2)+(4x-2)=180$

$8x=180$

$x=22.5$

$m\angle 6 = 4(22.5)-2 = 88°$

$m\angle 5 = 92°$ ($\angle 5$ is suppl. to $\angle 6$).

#17 $\angle 3$ and $\angle 5$ are supplementary (interior $\angle$'s on the same side of the transversal)

① $(6x+y)+(8x+2y)=180$

$\angle 5$ and $\angle 6$ are supplementary.

② $(8x+2y)+(4x+7y)=180$

Solve the 2x2 system:

$$\begin{cases} 6x+y+8x+2y=180 & \text{①} \\ 8x+2y+4x+7y=180 & \text{②} \end{cases}$$

$$\begin{cases} 14x+3y=180 \\ 12x+9y=180 \end{cases} \Big| \div(-3)$$

$$\begin{cases} 14x+3y=180 \\ -4x-3y=-60 \end{cases}$$

(+) $10x=120 \Rightarrow x=12$

$14x+3y=180 \Big| \; x=12$

$\Rightarrow 14(12)+3y=180$

$3y=12 \Rightarrow y=4$

$m\angle 6 = 4(12)+7(4)=76$

$m\angle 7 = 76$

SECTION 2.2

#2 if $x>2$, then $x\neq 0$

Converse if $x\neq 0$, then $x>2$. (F)

Inverse if $x\not>2$, then $x=0$ (F)

OK, we can write

if $x\leq 2$, then $x=0$

Contrapositive if $x=0$, then $x\not>2$ (True)

OK, we can write

if $x=0$, then $x\leq 2$.

#4

Converse in a plane, if 2 lines are not parallel, then these 2 lines are not $\perp$ to the same line. (T)

Inverse in a plane, if 2 lines are $\perp$ to the same line, then these lines are parallel (T)

Contrapositive in a plane, if 2 lines are $\parallel$, then these 2 lines are $\perp$ to the same line (T)

#(8) $X \leq 3$

#(18) Assume $X = 5$
then $X^2 = 25$.
Contradiction with the hypothesis
$X^2 \neq 25$
$\Rightarrow$ our assumption is false
$\Rightarrow$ $X \neq 5$.

SECTION 2.4

#4. Given: $m\angle B = 42°$
$m\angle A = m\angle C$
Find: $m\angle A = ?$
$m\angle C = ?$

Solution

$m\angle A + m\angle B + m\angle C = 180°$
$2m\angle A + 42° = 180°$
$2m\angle A = 180° - 42°$
$2m\angle A = 138°$
$m\angle A = 69°$
$m\angle C = 69°$

#15

Statements	Reasons.
1. $\overline{AB} \parallel \overline{DC}$	1. given
2. $m\angle A + m\angle ADC = 180°$	2. int. $\angle$'s on same side of transv. are supplementary
3. $m\angle A = 110°$	3. given
4. $110° + m\angle ADC = 180°$	4. substitution
5. $m\angle ADC = 70°$	5. Subtraction prop. of =
6. $\overline{DB}$ bisects $\angle ADC$	6. given
7. $m\angle 1 = m\angle 2 = \frac{1}{2} m\angle ADC$	7. bisector divides angle into 2 $\cong$ $\angle$'s
8. $m\angle 2 = \frac{1}{2} \cdot 70°$	8. substitution
$m\angle 2 = 35°$	
9. $\angle 3 \cong \angle 2$	9. Alt. int. $\angle$'s ($\overline{AB} \parallel \overline{DC}$ with transv. $\overline{BD}$)
10. $m\angle 3 = m\angle 2$	10. def. of $\cong$
11. $m\angle 3 = 35°$	

#16

Statements	Reasons.
1. $\overrightarrow{DB}$ bisects $\angle ADC$	1. given
2. $m\angle 1 = m\angle 2$	2. def. of bisector
3. $m\angle 1 = 36°$	3. given
4. $m\angle 2 = 36°$	4. transitivity.
5. $m\angle 1 + m\angle 2 = m\angle ADC$	5. Angle-Addition Postulate
6. $m\angle ADC = 72°$ (3,4,5)	6. substitution
7. $\overline{AB} \parallel \overline{DC}$	7. given
8. $m\angle A + m\angle ADC = 180°$	8. int. $\angle$'s on same side of transv. are suppl.
9. $m\angle A + 72 = 180$	9. Subst.
10. $m\angle A = 180 - 72$	10. Subtr. of =
$m\angle A = 108$	

#17 $\angle 5$ and $\angle 1$ are supplementary
$m\angle 5 + m\angle 1 = 180°$
$m\angle 5 + 70 = 180 \Rightarrow m\angle 5 = 110$

$\triangle ABD$: $m\angle 3 + m\angle B + m\angle 5 = 180°$
$30° + m\angle B + 110 = 180°$
$m\angle B + 140° = 180°$
$m\angle B = 180 - 140$
$m\angle B = 40°$

#23 $\angle 1$ and $\angle 2$ are supplementary $\Rightarrow$

$m\angle 1 + m\angle 2 = 180°$

(1) $x + 4y = 180$

$\angle 3$ and $\angle 4$ are supplementary $\Rightarrow$

$m\angle 3 + m\angle 4 = 180°$

(2) $2y + 2x - y - 40 = 180$

Solve the 2x2 system:

$$\begin{cases} x + 4y = 180 & (1) \\ 2y + 2x - y - 40 = 180 & (2) \end{cases}$$

$$\begin{cases} x + 4y = 180 \\ 2x + y = 220 \end{cases} \quad \Big| -2$$

$$\begin{cases} -2x - 8y = -360 \\ 2x + y = 220 \end{cases}$$

(+) $-7y = -140$

$y = 20$

$x + 4y = 180$

$x + 4(20) = 180 \Rightarrow x = 100$

$m\angle 2 = 80°$

$m\angle 3 = 40°$

$m\angle 5 = 60°$