Math 61

Homework #7 - Solutions

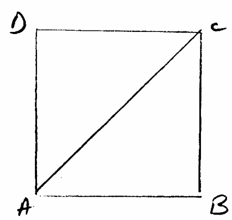
Section 3.5

(22) 1. Equilateral $\triangle ABC$ with D-B-C

2. An equilateral $\triangle$ is also an equiangular $\triangle$ that has 3 $\angle$'s of equal measure.

4. $m\angle C > m\angle D$

5. $DA > AC$; $\triangle$, if two sides $\neq$, opp $\angle$'s $\neq$, same order.



(30) Given ABCD square

Prove $AC > AB$

Proof

Assume $AC \not> AB$

Then: Case ① $AC = AB$

OR

Case ② $AC < AB$

Case ① $AC = AB$

Then $\triangle ABC$ - equilateral

$\Rightarrow m\angle B = 45°$

contradiction with ABCD square ($m\angle B = 90°$)

Therefore, case ① is not possible

Case ② $AC < AB$

Then, in $\triangle ABC$, $m\angle B < m\angle ACB$

($\triangle$, two sides $\neq$, opp. $\angle$'s $\neq$, same order)

Contradiction with ABCD square with $m\angle B = 90°$)

Therefore, our assumption is false $\Rightarrow AC > AB$

OR

Given ABCD square

Prove $AC \neq AB$

Proof

Assume $AC = AB$.

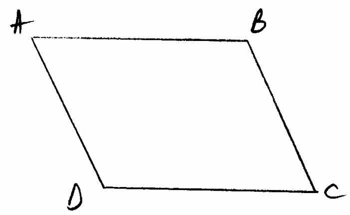
This contradicts the fact that the shortest distance from a point to a line is the $\perp$ distance (That is $AB < AC$)

Therefore, our assumption is false $\Rightarrow AC \neq AB$.

Likewise, AC cannot equal the length of any of the sides of the square.

Section 4.1

(8)



Given $m\angle A = 2x+y$

$m\angle B = 2x+3y-20$

$m\angle C = 3x-y+16$

Find $m\angle A, m\angle B, m\angle C, m\angle D$

Proof

$$\begin{cases} m\angle A + m\angle B = 180^\circ & \text{(1)} \\ m\angle A = m\angle C & \text{(2)} \end{cases}$$

(1) (consecutive ∠'s in a ▱ are supplementary)

(2) (opposite ∠'s in a ▱ are congruent, hence have the same measure)

$$\begin{cases} (2x+y)+(2x+3y-20) = 180 & \text{(1)} \\ 2x+y = 3x-y+16 & \text{(2)} \end{cases}$$

$$\begin{cases} 4x+4y = 200 \\ -x+2y = 16 \end{cases} \Big| \div 4$$

$$\begin{cases} x+y = 50 \\ -x+2y = 16 \end{cases}$$

(+) $3y = 66 \Rightarrow \boxed{y = 22}$

$x + y = 50$

$x + 22 = 50 \Rightarrow \boxed{x = 28}$

Therefore, $m\angle A = m\angle C = 78^\circ$

$m\angle B = m\angle D = 102^\circ$