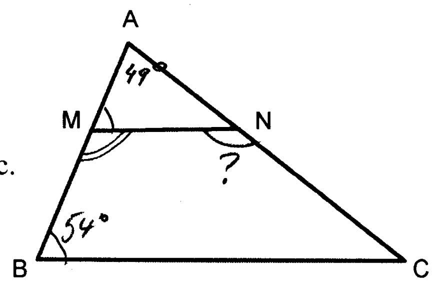
Math 61 Spring 2007 Name:

QUIZ #2 @ 85 points

Write in a neat and organized fashion. Use a pencil. Show all work to get credit.

1. In the given figure, $\overline{MN} \parallel \overline{BC}$.



a) Name one pair of congruent angles. Justify your choice. Be specific.

$\angle AMN \cong \angle ABC$ (corresponding angles)
$\overline{MN} \parallel \overline{BC}$ with transversal $\overline{AB}$

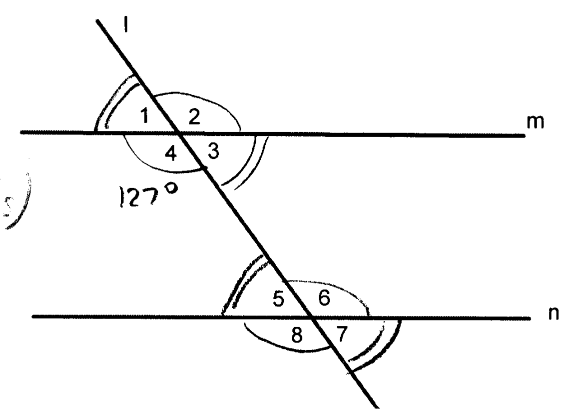
b) Name one pair of supplementary angles. Justify your choice. Be specific.

$\angle ABC$ and $\angle NMB$ (same side interior angles — $\overline{MN} \parallel \overline{BC}$ with transversal $\overline{AB}$)

c) If $m\angle A = 49^\circ$ and $m\angle B = 54^\circ$, find $m\angle CNM$. Justify your answer.

$m\angle A + m\angle B + m\angle C = 180^\circ$ ($\triangle ABC$)
$\Rightarrow m\angle C = 180^\circ - 54^\circ - 49^\circ$
$m\angle C = 77^\circ$
$\angle C$ and $\angle CNM$ = supplementary $\Rightarrow m\angle CNM = 180^\circ - 77^\circ$
($\overline{MN} \parallel \overline{BC}$, transversal $\overline{AC}$) $m\angle CNM = 103^\circ$

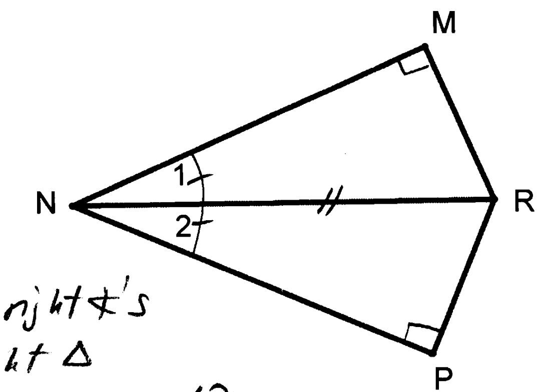
2. In the given figure, $m \parallel n$ and $m\angle 4 = 127^\circ$.
Find the measure of all angles 1 through 8.
Explain your reasoning.



$m\angle 4 = 127^\circ$ - given
$m\angle 2 = m\angle 4 = 127^\circ$ (vertical $\angle$'s)
$m\angle 8 = m\angle 4 = 127^\circ$ (corresponding $\angle$'s)
$m\angle 6 = m\angle 8 = 127^\circ$ (vertical $\angle$'s)
$\angle 1$ and $\angle 4$ = supplementary
$m\angle 1 = 180^\circ - 127^\circ$
$= 53^\circ$
$m\angle 3 = m\angle 1 = 53^\circ$ (vertical $\angle$'s)
$m\angle 5 = m\angle 3 = 53^\circ$ (alternate interior $\angle$'s)
$m\angle 7 = m\angle 5 = 53^\circ$ (vertical $\angle$'s)

3. Given: $\overline{NM} \perp \overline{MR}$
$\overline{NP} \perp \overline{PR}$
$\angle 1 \cong \angle 2$

Prove: $\overline{MR} \cong \overline{PR}$



Proof

1. $\overline{NM} \perp \overline{MR}$, $\overline{NP} \perp \overline{PR}$ — 1. given
2. $\angle NMR$, $\angle RPN$ = right ∡'s — 2. ⊥ iff right ∡'s
3. $\triangle NMR$, $\triangle NPR$ = right △'s — 3. def. right △
4. $\triangle NMR$, $\triangle NPR$ right △'s $\left\{ \begin{array}{l} \overline{NR} \cong \overline{NR} \\ \angle 1 \cong \angle 2 \end{array} \right.$ — 4. $\left\{ \begin{array}{l} \text{reflexive prop of } \cong \\ \text{given} \end{array} \right.$
5. $\triangle NMR \cong \triangle NPR$ — 5. HA
6. $\overline{MR} \cong \overline{PR}$ — 6. CPCTC

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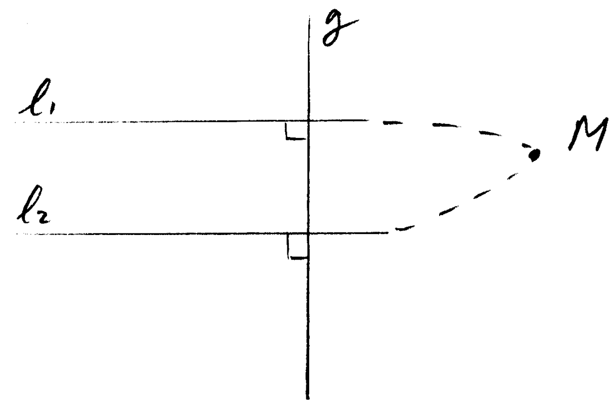
4. Give an indirect proof of the following :

If two coplanar lines are each perpendicular to a third line, then these lines are parallel to each other.

State the hypothesis and the conclusion; make a drawing.



Hypothesis: (given) $l_1 \perp g$
$l_2 \perp g$
l_1, l_2 = coplanar

Conclusion: (prove) $l_1 \parallel l_2$

Proof

Assume $l_1 \nparallel l_2$, l_1, l_2 = coplanar $\Big\} \Rightarrow l_1 \cap l_2 = M$

Given line g and pct. M, we have two lines through M perpendicular to g: $l_1 \perp g$, $M \in l_1$; $l_2 \perp g$, $M \in l_2$

Contradiction with: given a line and a point outside a line, there is only one line ⊥ given line through the given point

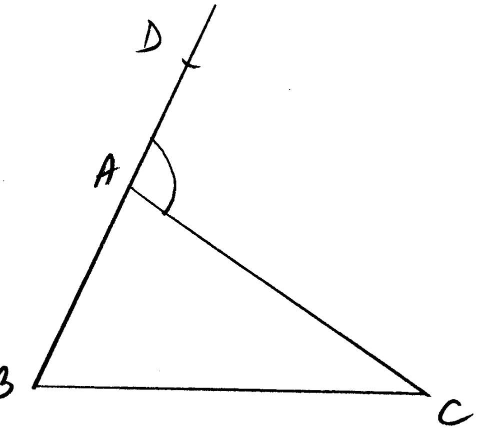
Therefore, $l_1 \parallel l_2$

5.

First, **complete the theorem**:

The measure of an exterior angle of a triangle is equal to the sum *of the measures of the nonadjacent interior angles.*

Then, **prove the theorem** (formal proof).



State the hypothesis and the conclusion of the theorem.

~~Hint: An auxiliary construction (line) is needed to complete the proof.~~

Hypothesis: $\triangle ABC$ with exterior $\angle CAD$

Conclusion: $m\angle DAC = m\angle B + m\angle C$

Proof

1. $\triangle ABC$ with exterior angle $\angle CAD$	1. given
2. $m\angle A + m\angle B + m\angle C = 180°$	2. sum of ∡'s of $\triangle = 180°$
3. $\angle A$ and $\angle CAD$ = supplementary	3. given (figure)
4. $m\angle A + m\angle CAD = 180°$	4. definition of supp. ∡'s
5. $m\angle A + m\angle B + m\angle C = m\angle A + m\angle CAD$ (2,4)	5. substitution
6. $m\angle B + m\angle C = m\angle CAD$	6. +/- property of equality