Math 61 Spring 2006 Name: SOLUTIONS

QUIZ #1 @ 30 points

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

1) Write the converse, inverse, and contrapositive of the following statement: (3 points)

If I do not practice, then I do not improve. $(P \to Q)$

Converse $(Q \to P)$ If I don't improve, then I don't practice

Inverse $(\sim P \to \sim Q)$ If I practice, then I improve.

Contrapositive $(\sim Q \to \sim P)$ If I improve, then I practice.

2) Form a truth table and determine all possible truth values for $(P \vee Q) \to P$. (4 points)

Is the given statement a tautology?

P	Q	$P \vee Q$	$(P \vee Q) \to P$
T	T	T	T
T	F	T	T
F	T	T	F
F	F	F	T

Not a tautology.

3) Complete the following to make valid arguments: (3 points)

a) Premise 1: $P \to Q$

Premise 2: $\sim Q$

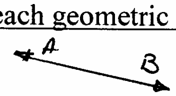
Conclusion: $\sim P$

b) Premise 1: $P \to Q$

Premise 2: $Q \to R$

Conclusion: $P \to R$

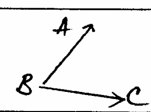
4) Classify the following names as names of *points, lines, segments, distances, rays*, or *angles*.
Make a drawing for each geometric figure. (4 points)

a) $\overleftrightarrow{AB}$ line  Check one: geometric figure ☑ real number ☐

b) $\overrightarrow{AB}$ ray  Check one: geometric figure ☑ real number ☐

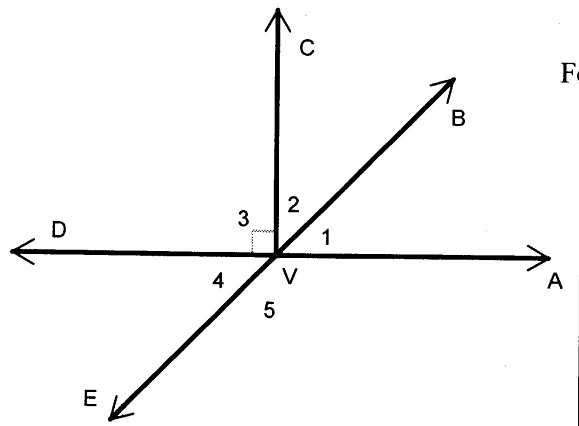
c) $\overline{AB}$ segment  Check one: geometric figure ☑ real number ☐

d) AB distance Check one: geometric figure ☐ real number ☑

e) $\angle ABC$ angle  Check one: geometric figure ☑ real number ☐

5)

(6 points)



For the given figure, complete the following:

a) All pairs of complementary angles:

<1 and <2

<4 and <2

b) All pairs of supplementary angles:

< 4 and <5   <2 and < CVE

<5 and <1   <4 and < DVB

<1 and < BVD   < 3 and < CVA

c) One example of adjacent angles:

<1 and <2 OR <4 and <5

< 4 and 3 OR < 3 and < 2

d) All pairs of vertical angles:

<4 and <1

< BVD and < EVA

e) All pairs of opposite rays:

$\overrightarrow{VD}$ and $\overrightarrow{VA}$

$\overrightarrow{VE}$ and $\overrightarrow{VB}$

f) All right angles:

<3 , < CVA

g) All collinear points along with the line they belong to: D, V, A on $\overleftrightarrow{DA}$

E, V, B on $\overleftrightarrow{EB}$

h) All straight angles

∠ DVA , ∠ EVB

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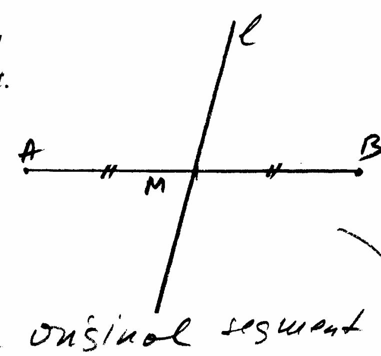
6) State the hypothesis and the conclusion for the following statement. Make a drawing to illustrate the statement.

(5 points)

If a line segment is bisected, then each of the equal segments has half the length of the original segment.

Hypothesis: $\{ \ell \cap \overline{AB} = M$, M = midpoint of $\overline{AB}$ (A line segment is bisected)

Conclusion: $\{ AM = MB = \frac{1}{2} AB$ (Each of the equal segments has half the length of the original segment)



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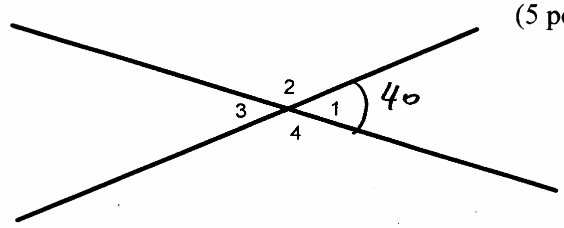
7)

(5 points)

If $m\angle 1 = 40^\circ$, find $m\angle 2$, $m\angle 3$, and $m\angle 4$.



<1 ≅ <3 as vertical angles

m<1 = m<3 = 40°

m<1 + m<2 = 180° as supplementary angles

40° + m<2 = 180°

$\boxed{m<2 = 140°}$

m<4 = m<2 (as vertical angles)

$\boxed{\text{so } m<4 = 140°}$

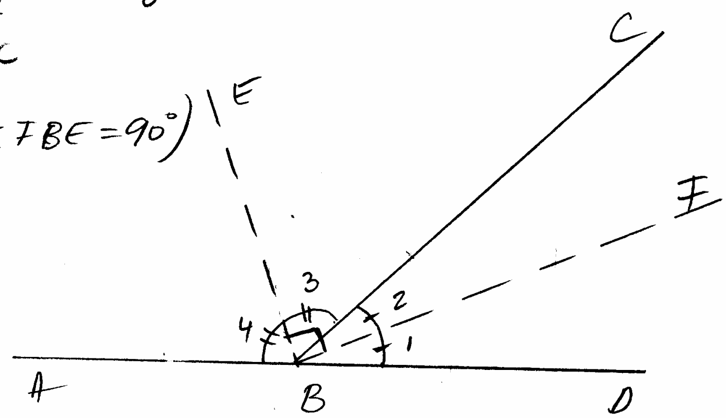
Extra Credit @ 5 points

State the hypothesis and the conclusion for the following statement. Make a drawing to illustrate the statement.

The bisectors of two adjacent supplementary angles form a right angle.

Hypothesis: $\angle ABC$ & $\angle CBD$ = supplementary
$\overrightarrow{BF}$ bisects $\angle DBC$
$\overrightarrow{BE}$ bisects $\angle ABC$

Conclusion: $BE \perp BF$ ($m\angle FBE = 90^\circ$)



Proof (formal or informal):

$\overrightarrow{BF}$ bisects $\angle DBC$ $\Rightarrow$ $\boxed{m\angle 1 = m\angle 2}$ (1)

$\overrightarrow{BE}$ bisects $\angle ABC$ $\Rightarrow$ $\boxed{m\angle 3 = m\angle 4}$ (2)

$\angle ABC$ & $\angle CBD$ = supplementary $\Rightarrow$ $\boxed{m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 180^\circ}$ (3) $\Rightarrow$

(along with Angle-Addition Postulate)

if we substitute (1) and (2) into (3):

$m\angle 2 + m\angle 2 + m\angle 3 + m\angle 3 = 180^\circ$

$2m\angle 2 + 2m\angle 3 = 180^\circ$

$m\angle 2 + m\angle 3 = 90^\circ$

$m\angle FBE = 90^\circ$

$BE \perp BF$