Math 61 Spring 2009 Name:

QUIZ #1 @ 70 points SOLUTIONS

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. Then state whether it is true or false.

P → Q

If the sum of two angles is 90°, then the angles are complementary.

Converse $Q \to P$: if two angles are complementary, then their sum is 90°.

(True) or false?

Inverse $\sim P \to \sim Q$: if the sum of two angles is not 90°, then the angles are not complementary

(True) or false?

Contrapositive $\sim Q \to \sim P$: if two angles are not complementary, then their sum is not 90°

(True) or false?

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2) If P is false, Q is true, and R is true , find the truth value of

$$(\sim P \vee Q) \to (Q \wedge R)$$

$$(T \vee T) \to (T \wedge T)$$

$$T \to T$$

$$T$$

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3) Complete the following to make valid arguments:

a) Premise 1: $M \to N$

Premise 2: $\sim N$

Conclusion: $\sim M$

b) Premise 1: $A \to B$

Premise 2: $B \to C$

Conclusion: $A \to C$

c) Premise 1: $P \vee R$

Premise 2: $\sim R$

Conclusion: P

d) Premise 1: $C \to D$

Premise 2: C

Conclusion: D

4) Write each of the following statements in the form "if p, then q". Then identify the hypothesis and conclusion:

a) *You cannot comprehend geometry if you do not know how to reason deductively .*

[If you do not know how to reason deductively, then you cannot comprehend geometry

Hypothesis: you do not know how to reason deductively

Conclusion: you cannot comprehend geometry

b) All integers are rational numbers.

[if a number is an integer, then the number is rational

Hypothesis: A number is an integer.

Conclusion: The number is rational

c) A triangle with two sides of the same length is isosceles.

[if a triangle has two sides of the same length, then the triangle is isosceles

Hypothesis: A triangle has 2 sides of the same length

Conclusion: The triangle is isosceles.

d) A rectangle is a parallelogram with a right angle.

[if a geometric figure is a rectangle, then it is a parallelogram with a right angle

Hypothesis: A geometric figure is a rectangle

Conclusion: It is a parallelogram with a right angle

e) Vertical angles have the same measure.

[if two angles are vertical angles, then they have the same measure

Hypothesis: Two angles are vertical

Conclusion: They have the same measure

5) a) Write the negation of $P \vee Q$; that is, complete the statement: $\sim(P \vee Q) \equiv$ $\sim P \wedge \sim Q$

b) Prove the above law using a truth table. Explain in words why the table shows that the two statements are equivalent.

P	Q	$P \vee Q$	$\sim(P \vee Q)$	$\sim P$	$\sim Q$	$\sim P \wedge \sim Q$
T	T	T	F	F	F	F
T	F	T	F	F	T	F
F	T	T	F	T	F	F
F	F	F	T	T	T	T

The statement $\sim(P \vee Q)$ is equivalent to the statement $\sim P \wedge \sim Q$ because they have the same truth values for all possible true / false combinations of their components

6) State whether each argument is VALID or INVALID:

a) Some philosophers are absent-minded.
b) Amanda is a philosopher.

Amanda is absent- minded.

invalid

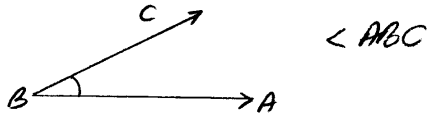
a) All people who apply for a loan must pay for a title search.
b) Cindy paid for a title search.

Cindy applied for a loan.

invalid

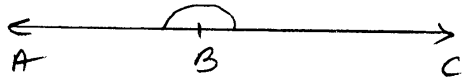
7) Do the following:

a) Draw an acute angle and name it.



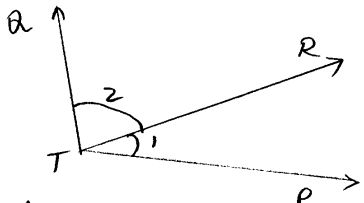
$\angle ABC$

b) Draw a straight angle and name it.



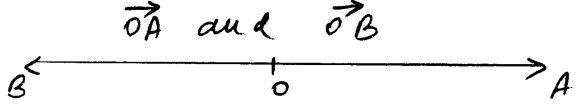
$\angle ABC$

c) Draw two adjacent angles and name them.

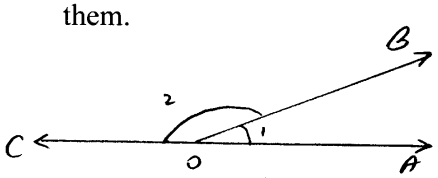


$\angle PTR$ and $\angle RTQ$

d) Draw two opposite rays and name them.

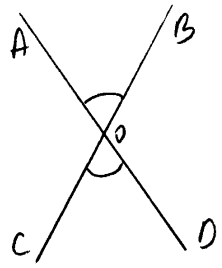


c) Draw two supplementary angles and name them.



$\angle AOB$ and $\angle BOC$

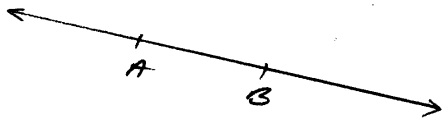
f) Draw two vertical angles and name them.



$\angle AOB$ and $\angle COD$

8) a) Draw a line. Name it using math notation.

$\overleftrightarrow{AB}$

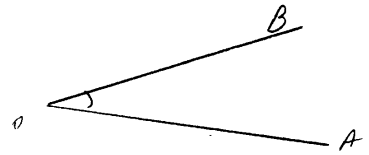


b) Draw a line segment. Name it using math notation.

$\overline{MN}$

c) Draw an angle. Name it using math notation.

$\angle AOB$



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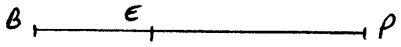
9) Complete the following *Postulates* .

a) Two distinct points determine a line

b) Given two distinct points in a plane, the line through these points is also in the plane

c) *Segment – Addition Postulate:*

If E is a point on a segment BP, then $BE + EP = BP$



d) *Angle – Addition Postulate:*

If B is a point in the interior of the angle ACR, then $m\angle ACB + m\angle BCR = m\angle ACR$