

Math 301
Quiz 2
Spring 2005

Read the instructions and write your answers carefully. Missing a “little” word like “and,” “or,” “not,” or “if” could result in no credit for that problem. Don’t write trivial negations, like “It is not the case that *blah blah*.” Show me you have learned something.

Be neat and organized. Clearly indicate your answers. 20 points possible.

1. Write negations for each of the following statements.

(a) (2 pts.) John is dead and Paul is alive.

(b) (2 pts.) If Tom is Ann’s father, then Jim is her uncle.

(c) (3 pts.) $\forall a, b, c \in \mathbb{Z}$, if $a - b$ is even and $b - c$ is even, then $a - c$ is even.

2. (3 pts.) Use the contrapositive to rewrite the statement in if-then form in two ways.

Being proud is a necessary condition for my being part of an original crowd.

3. (2 pts.) Use modus ponens or modus tollens to fill in the blank in the following argument so as to produce a valid inference.

If Glyn assembled the recordings, then Phil ruined the album.

\therefore Glyn did not assemble the recordings.

4. (4 pts.) Use a truth table to determine whether the argument form is valid or invalid. Indicate which columns represent the premises and which represent the conclusion of the argument. Clearly label the “critical rows.” Don’t forget to say “valid” or “invalid”!

$p \rightarrow q$
 $q \rightarrow r$
 $\therefore p \rightarrow r$

5. (2 pts.) Let D be the set of all students at Elmhurst College. Let $M(s)$ be “ s is a math major,” let $C(s)$ be “ s is a computer science student,” and let $P(s)$ be “ s is a physics student.” Express the following statement using the symbol \forall or \exists , variables, and the predicates $M(s)$, $C(s)$, or $P(s)$.

Every physics student is a computer science student.

6. (2 pts.) Consider the following string of numbers: 6174. A person claims that all the 2’s in the string are to the left of the 6 in the string. Is this true? Justify your answer.