

CSCI 246: Test 1

William Jardee

Problem 1

Let $S = \{a, b, 1, 2\}$. List the power set (set of all the subsets of S).

$$\mathcal{P}(S) = \{\{\}, \{a\}, \{b\}, \{1\}, \{2\}, \{a, b\}, \{a, 1\}, \{a, 2\}, \{b, 1\}, \{b, 2\}, \{1, 2\}, \\ \{a, b, 1\}, \{b, 1, 2\}, \{a, b, 2\}, \{a, 1, 2\}, \{a, b, 1, 2\}\}$$

Problem 2

If x is divisible by 18, then x is divisible by 9 and x is divisible by 2.

$p = x$ is divisible by 18

$q = x$ is divisible by 9 x is divisible by 2

1. Negation:

x is divisible by 18 and [x is not divisible by 9 or x is not divisible by 2]

Alternatively you could write:

x is divisible by 18 and x is not divisible by 9 or x is divisible by 18 and x is not divisible by 2

2. Contrapositive:

If x is not divisible by 9 or x is not divisible by 2, then x is not divisible by 18.

3. Converse:

If x is divisible by 9 and x is divisible by 2, then x is divisible 18.

4. Inverse:

If x is not divisible by 18, then x is not divisible by 9 or x is not divisible by 2.

Problem 3

If a computer program is correct, then compilation of the program does not produce error messages.

Compilation of this program produces error messages.

\therefore The computer program is not correct.

I just needed to finish the contrapositive.

Problem 4

What are A and B?

This is a perfectly logical statement. If A is a knight and B is a Knave, then A is correct in saying that B is a Knave, as B is incorrect. I would say, however, that these statements by A and B are confusing.

A is a knight B is a Knave

Problem 5

1. Write a negation for the statement:
 \exists integer d if $\frac{18}{d}$ is an integer, then $d = 3$.
Negation: \forall integer d , $\frac{18}{d}$ is an integer and $d \neq 3$.
2. Is the statement in 5.1 correct? Explain your reason.
It took me a couple times looking over this question to actually get the right answer eventually.
 \exists integer d if $\frac{18}{d}$ is an integer, then $d = 3$;
Since $d = 3$ is an integer, and $\frac{18}{3} = 6$, 6 is an integer so the statement is valid (correct).