MTH 299-102 / In-class assignment #3 – Answer Key  Wednesday 5/24/17

Name: ___________________________       ID: _____________

NOTE: Write clearly on the given paper only. Use the back of the paper if necessary.

(1) Which of the following are statements? For those that are statements, determine whether they are true or false.
   (a) The first president of the US is not George Washington.
   (b) Is 19 a prime number?
   (c) $\sqrt{3}$ and 3 are integers.
   (d) Write down the negation of the statement “$\sqrt{3}$ and 3 are integers”.
   Also, do part (d); that is, write down the negation of the statement “$\sqrt{3}$ and 3 are integers”.

Solution. (a) This is a statement. The statement is false.
   (b) This is not a statement; it is a question.
   (c) This is a statement. The statement is false.
   (d) This is not a statement; it is a command.

We now do part (d). The negation of statement (c) is

$\sqrt{3}$ is not an integer or 3 is not an integer,

which is the same as

Either $\sqrt{3}$ or 3 is not an integer.

Note that the negation of the statement (c) is true.

(2) Let $A$, $B$ and $C$ be statements. Write the following statements using the logical symbols $\neg, \land, \lor, \Rightarrow$.

   (a) not($A$ or $B$). Answer: $\neg(A \lor B)$
   (b) $A$ or (not $B$). Answer: $A \lor (\neg B)$
   (c) (not($A$ or $B$)) and $C$. Answer: $(\neg(A \lor B)) \land C$
   (d) $A$ and ($B$ or $C$). Answer: $A \land (B \lor C)$
   (e) $A$ implies ($B$ or $C$). Answer: $A \Rightarrow (B \lor C)$

Also, complete the following truth table:

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<th>not($A$ or $B$)</th>
<th>$B$ or $C$</th>
<th>(not($A$ or $B$)) and $C$</th>
<th>$A$ and ($B$ or $C$)</th>
<th>$A$ implies ($B$ or $C$)</th>
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