Problem Set 2 **Foundations** **Due 2/1/16**

Four of these problems will be graded (our choice, not yours!), with each problem worth 5 points. Clear and complete justification is required for full credit. You are welcome to discuss these problems with anyone and everyone, but must write up your own final submission without reference to any sources other than the textbook and instructor.

1. If $a \equiv_n 1$ and $b \equiv_n 1$, then $a \cdot b \equiv_n 1$.

2. If $a \equiv_n 1$ and $b \equiv_n 1$, then $a + b \equiv_n 1$.

3. If $a \equiv_n 0$ and $b \equiv_n c$, then $a + b \equiv_n c$.

4. If n, a, and b are integers for which $a \equiv_n b$, then $a + 1 \equiv_n b + 1$.

5. Do the WeBWorK "Implication" assignment, available via

   http://crlinwebwork2.coe.edu/webwork2/MTH-215/

6. Do the WeBWorK "Truth Tables" assignment, available via

   http://crlinwebwork2.coe.edu/webwork2/MTH-215/

7. Score at least 6 out of 7 on the Truth Tables Gateway on WeBWorK, available via

   http://crlinwebwork2.coe.edu/webwork2/MTH-215/quiz_mode/TTGateway/

8. The statements $\neg(P \wedge Q)$ and $\neg P \vee \neg Q$ are logically equivalent. [DeMorgans Law]
9. A statement and its contrapositive are logically equivalent.
10. The statements $P \wedge (Q \vee R)$ and $(P \wedge Q) \vee R$ are logically equivalent.
11. The statements $P \wedge (Q \vee R)$ and $(P \wedge Q) \vee (P \wedge R)$ are logically equivalent.
12. $\sqrt{3}$ is irrational.