MATH 150 HOMEWORK 1

DUE: Wednesday, October 17

Student Name/Id # (Include all students in the group):

IMPORTANT INSTRUCTION: It is crucial that you clearly state justifications for all your conclusions. This is the point of the homeworks – to practice understanding of the material and the ability to express your understanding.

1. Use the "fast" method to determine if the given formula is a tautology.

(a) $((A \to C) \to (B \to C)) \to ((A \vee B) \to C)$

(b) $(A \leftrightarrow (B \vee C)) \to ((A \vee B) \to C)$.

2. Given is a Boolean function $F : \{0,1\}^3 \to \{0,1\}$ with three arguments and the following values:

$$F(1,1,1) = F(1,1,0) = F(0,1,0) = F(0,0,0) = 1,$$

and $F(x,y,z) = 0$ otherwise; here of course x, y, z attain value 0 or 1.

Find a formula φ built from letters A, B, C such that $B^3_\varphi = F$.

3. Determine if the following sets of sentential connectives are complete.

(a) $\{\wedge, \to\}$

(b) $\{\neg, \to\}$.

You may use the fact that the sets $\{\neg, \wedge\}$ and $\{\neg, \vee\}$ are complete.