MAT 115 Test 1 Spring, 2013

1. Design a “unanimous” Boolean function with three inputs. The output of the function is true if all three inputs have the value true and the output is false otherwise. Your answer should be a propositional logic expression with 3 propositional variables.
2. Prove using Table 12-1 that

S ≡ (G  S)  (S  ~G)

1. a) Is  associative? Why or why not?

b) A connective @ has the idempotence property iff for all propositions p

p  p@p

How many binary connectives (in 2-valued logic) have the idempotence property?

1. Someone says the following to you: ”If you were in your room last night, you would have opened the door when I knocked. You didn’t open the door. Therefore, you weren’t in your room.”

a) Show that their argument is valid.

b) Explain how you could come up with a “counterargument”. What does this say in general about the relevance of the validity of an argument?

c) What does this have to do with entering your hourly pay as 200.00 (U.S. dollars per hour) into a calculator and entering your hours worked this pay period as 20 and multiplying them together?

1. Show validity or invalidity using any convincing method:

If it is raining or snowing, the roads are slippery. If the roads are slippery, you should drive slowly. It is raining. Therefore, you should drive slowly.