

Name: \_\_\_\_\_

PanthID: \_\_\_\_\_

Homework 1      MAA 3200

Fall 2009

1. (4 pts) (Pb. 8, section 1.1): On a certain island (Manhattan), the inhabitants are divided into two types, those who always tell the truth and those who always lie. One day a visitor stops three inhabitants of the island to ask directions to a well-known museum (The Guggenheim).

"All three of us are liars", warns the first inhabitant.

"Not so; only two of us are liars", says the second.

"Not so", says the third, "the other two guys are lying."

Which, if any, of the three islanders can the visitor trust to give honest directions? Justify your answer. (Try to be concise, but, at the same time, try to fully justify your answer.)

2. (6 pts) (a) (3 pts) Are the expressions

$$(P \rightarrow Q) \wedge (Q \rightarrow R) \text{ and } P \rightarrow R$$

logically equivalent? Justify your answer.

(b) (3 pts) Show that the following is a tautology (it is one of the distributive laws):

$$[P \wedge (Q \vee R)] \leftrightarrow [(P \wedge Q) \vee (P \wedge R)]$$