Exercises 1.3

1. Using truth tables, show that all of the arguments in Table 1.2 are valid.

2. Using modus ponens or modus tollens, fill in the blanks so as to produce a valid argument.

(a) If π is rational, then $\pi = a/b$ for some integers a and b.
It is not true that $\pi = a/b$ for some integers a and b.
$\therefore$ ______________________________

(b) If logic is easy, then I am a monkey's uncle.
I am not a monkey's uncle.
$\therefore$ ______________________________

(c) If they were unsure of the address, then they would have telephoned.
____
$\therefore$ They were sure of the address.

3. Let M, P and J represent the propositions:

M : "Mary does her homework."
P : "Peter does his homework."
J : "Jim does his homework."

Using the propositions M, P and J, analyze the logical form of the following argument. Identify the premises and the conclusion. Is the argument valid?

If Mary does her homework, then Peter will do his homework.
If Peter does his homework, then Jim will do his homework.
Mary does not do her homework.
Therefore, Jim does not do his homework.

4. Using the inference rules in Table 1.2, formally deduce the conclusion from the premises.

(a) $A \to (B \vee C)$
(b) $A \wedge \neg B$
$\therefore C$

5. Using the inference rules in Table 1.2, formally deduce the conclusion from the premises.

(a) $(P \wedge Q) \to R$
(b) $\neg(P \wedge Q) \to (\neg P \vee \neg Q)$
(c) $R \to S$
(d) $Q \wedge \neg S$
$\therefore \neg P$