Quiz 3

1. True or False? The statement below is DNF.   (5 pts.)

$$(p \wedge \neg q) \vee r$$

True, since it is a disjunction of conjunctions of variables or their negations.

(Note: according to the book, the answer would be false since the book also requires every variable to be present in each conjunction.)

2. Simplify the following statement. If it is a tautology or contradiction, you must say which for full credit on this problem.

$$[(p \wedge q) \to r] \vee (p \wedge \neg r)$$

If $[(p \wedge q) \to r]$ is true, then the statement is true.   (5 pts.)

If $[(p \wedge q) \to r]$ is false, then $(p \wedge q)$ is true and r is false.

   Hence p is true and $\neg r$ is true, and so $(p \wedge \neg r)$ is true.
   This shows the statement is true.

The statement is true in all cases, so it is a tautology.

(You can also use logical equivalences or truth tables to solve this question)

3. Determine the validity of the argument. You must clearly justify your answer for full credit. A correct response with little or no justification will not receive full credit.   (10 pts.)

$$p \to r$$
$$\frac{\neg p \to r}{r}$$

Suppose both assumptions hold.

If p is true, then r is true by the first assumption.

If p is false, then r is true by the second assumption.

In all cases, r is true so the argument is valid.
   i.e. truth value assignments to p and r where both assumptions hold

(You can also use truth tables)