Name: _____

Entry number: _____

There are 3 questions for a total of 10 points.

1. (a) (1 point) <u>State true or false</u>: The following compound proposition is a tautology.

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

(a) _____

(b) (2 ½ points) Give reason for your answer to part (a).

2. (3 points) Let $C(p, q, r)$ denote a compound proposition involving simple propositions p, q, and r. Give a compound proposition $C(p, q, r)$ the truth table of which matches the one given below. (*Note that there may be multiple correct answers for this question*)

p	q	r	$C(p, q, r)$
T	T	T	F
T	T	F	T
T	F	T	T
F	T	T	T
T	F	F	F
F	T	F	F
F	F	T	F
F	F	F	F

2. _____

3. (a) (1 point) <u>State true or false</u>: The following two compound propositions and are logically equivalent:

   - $(p \to q) \lor (r \to q)$
   - $(p \land r) \to q$

   (a) _____

   (b) (2 ½ points) Give reason for your answer to part (a).