1: Negate each of the following statements:

(a) It is Monday and it is snowing.

Answer: It is not Monday or it is not snowing.

(b) This book is red or it was written in 1887.

Answer: This book is not red and it was not written in 1887.

(c) If I tell you a joke, you will smile.

Answer: I tell you a joke and you do not smile.

2: Let X="Fred has red hair.", Y="Fred has freckles.", and Z="Fred likes to eat figs.".

(a) "Fred has red hair, and does not have freckles."

Answer: $X \wedge \neg Y$

(b) "Fred likes to eat figs, and he has red hair or he has a freckles."

Answer: $Z \wedge (X \vee Y)$

(c) "It is not the case that Fred has freckles or he has red hair."

Answer: $\neg(Y \vee X)$

(d) "It is not the case that Fred has freckles, or he has red hair."

Answer: $(\neg Y) \vee X \equiv \neg Y \vee X$

3: Make a truth table for: $(P \to R) \vee \neg(Q)$

Answer:

P	Q	R	$P \to R$	$\neg Q$	$(P \to R) \vee \neg Q$
T	T	T	T	F	**T**
T	T	F	F	F	**F**
T	F	T	T	T	**T**
T	F	F	F	T	**T**
F	T	T	T	F	**T**
F	T	F	T	F	**T**
F	F	T	T	T	**T**
F	F	F	T	T	**T**