MATH 290 - SUMMER 2009 - EXAM 1

1. "If a child didn't live with you, you earned less than \$9000, and you or your spouse were at least 25 you may be eligible to ~~take~~ take the EIC"

$$(\sim P) \wedge Q \wedge (R \vee S) \Rightarrow T$$ //

2. (a)

P	Q	$P \Leftrightarrow Q$	$\sim P \Leftrightarrow \sim Q$	$(P \Leftrightarrow Q) \Leftrightarrow (\sim P \Leftrightarrow \sim Q)$
T	T	T	T	T
T	F	F	F	T
F	T	F	F	T
F	F	T	T	T

(b)

P	Q	$P \Rightarrow Q$	$\sim P \vee Q$	$(P \Rightarrow Q) \Leftrightarrow (\sim P \vee Q)$
T	T	T	T	T
T	F	F	F	T
F	T	T	T	T
F	F	T	T	T

3. (a) There exists a real number x such that $x^2+2x+1=0$.

(b) There exist real numbers x and y such that x and y have different signs and $|x+y| \geq |x|+|y|$.

(c) For all $A>0$ there exists $x \in [a,b]$ such that $f(x) \leq A$.

4. Proof: Suppose that $a|b$ and $a|c$. This means that there exist integers k and j such that $b=ak$ and $c=aj$. Therefore $b-c=ak-aj=a(k-j)$. Since $k-j$ is an integer, $a|(b-c)$. ☒