1. Suppose $P(x) : x \in [-1, 2]$ and $Q(x) : x^2 \leq 2$ over the domain $S = [-2, 2]$.
2. For which values in the domain is the biconditional $P(x) \leftrightarrow Q(x)$ a true statement?
   Note: This is the final question from yesterday's groupwork.
3. Suppose $P(x, y) : x^2 - y^2 = 0$ and $Q(x, y) : x = y$. Determine the truth value of $P(x, y) \leftrightarrow Q(x, y)$ for $(x, y) \in \{(1, -1), (3, 4), (5, 5)\}$.
4. For statements P and Q show that $(P \wedge (P \rightarrow Q)) \rightarrow Q)$ is a tautology by writing out the truth table.

P	Q	$P \rightarrow Q$	$(P \wedge (P \rightarrow Q))$	$(P \wedge (P \rightarrow Q)) \rightarrow Q)$
T	T			
T	F			
F	F			
F	T			

5. Show that $P \rightarrow (Q \vee R) \equiv (\sim Q) \rightarrow ((\sim P) \vee R)$ by logically manipulating both sides to achieve the same statement.
6. Determine with justification if the following are true or false:
   (a) $\forall n \in \mathbb{Z}$, $(2n - 1)/5 \in \mathbb{Z}$.
   (b) $\exists n \in \mathbb{Z}$, $(2n - 1)/5 \in \mathbb{Z}$.
   (c) $\exists x \in \mathbb{Z}, \exists y \in \mathbb{R}$, $x^2 + y^2 = 3$
   (d) $\sim (\exists s \in \{3, 5, 11\}, \exists t \in \{3, 5, 11\}$, $st - 2$ is not prime)