MATH 215 HW 1 SOLUTIONS

Question 1

P	Q	$P \Rightarrow Q$
T	T	T
T	F	F
F	T	T
F	F	T

P	Q	Por$Q$	$(P$or$Q) \Rightarrow Q$	$Q \Rightarrow (P$or$Q)$	$(P$or$Q) \Leftrightarrow Q$
T	T	T	T	T	T
T	F	T	F	T	F
F	T	T	T	F	T
F	F	F	T	T	T

P	Q	$P$and$Q$	$(P$and$Q) \Rightarrow P$	$P \Rightarrow (P$and$Q)$	$(P$and$Q) \Leftrightarrow P$
T	T	T	T	T	T
T	F	F	T	F	F
F	T	F	T	T	T
F	F	F	T	T	T

Since the truth tables for $P \Rightarrow Q$, $(P$or$Q) \Leftrightarrow Q$ and $(P$and$Q) \Leftrightarrow P$ are the same, these statements are equivalent.

Question 2

Necessary:
(i), (v), (vii), (vii).

Sufficient:
(iii), (iv), (v), (vi).

P is *Necessary* for Q means that $Q \Rightarrow P$. So for example if $6|n$, then it is *necessarily* true that $3|n$. On the other hand, P is *sufficient* for Q means $P \Rightarrow Q$. For example, it is *not* sufficient for $2|n$ or $3|n$ in order for $6|n$. (For example that statement "$2|n$ or $3|n$" is true if $n = 3$, but $6 \nmid n$.) However, it is sufficient (but not necessary) that $12|n$ in order for $6|n$.

Question 3

P	Q	R	$(P \Rightarrow Q)$	$(Q \Rightarrow R)$	$(P \Rightarrow Q)\&(Q \Rightarrow R)$	$P \Rightarrow R$	$((P \Rightarrow Q)\&(Q \Rightarrow R)) \Rightarrow (P \Rightarrow R)$
T	T	T	T	T	T	T	T
T	T	F	F	F		F	T
T	F	T	T	F	F	T	T
T	F	F	T	F	F	F	T
F	T	T	T	T	T	T	T
F	T	F	F	F	F	T	T
F	F	T	T	T	T	T	T
F	F	F	T	T	T	T	T