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MATH3308
Week 3 Tutorials
23/3/17

1. (a) This is a fallacy of denying the antecedent
   (b) This is a valid instance of disjunctive syllogism.

2. (a) *Not a theorem* if P is false then $(P \Rightarrow \sim P) \Rightarrow \sim P$ is false.
   (b) *Theorem* $(P \Rightarrow \sim P)$ is only true when P is false so $(P \Rightarrow \sim P) \Rightarrow \sim P$ must be true, as the consequent must be true whenever the antecedent is true.
   (c) *Theorem* $[(P \Rightarrow Q) \wedge (R \Rightarrow P)]$ implies $R \Rightarrow Q$ and by contraposition $\sim Q \Rightarrow \sim R$. whenever the antecedent is true the consequent is true.
   (d) *Not a Theorem* We can see if R, P is false and Q is true then $[(P \Rightarrow Q) \wedge (R \Rightarrow P)] \Rightarrow (\sim R \Rightarrow \sim Q)$ as the antecedent is true and the consequent is false.

3. (a)
$$f(n) = n + 1$$
   (b)
$$f(n) = n - 1$$
   (c)
$$f(n) = \begin{cases} \text{2n} & \text{if } n \text{ is not negative} \\ \text{-2n - 1} & \text{if } n \text{ is negative} \end{cases}$$
   (d)
$$f(n) = \begin{cases} \frac{n}{2} & \text{if } n \text{ is even} \\ \frac{-(n-1)}{2} & \text{if } n \text{ is odd} \end{cases}$$

4.