Prove that $\lim_{x \to 4} \frac{5x^2 - 20x}{x - 4} = 20$. 
Show that for any real number $x$, there is a unique $y$ such that $3x + 2y = 5$. 
Prove that if \(|x - 5| > 3\), then \(x < 2\) or \(x > 8\).
Prove that if $(\forall x)[P(x) \rightarrow Q(x)]$ and $(\exists x)P(x)$, then $(\exists x)Q(x)$. 
Prove that $A \setminus (B \cup C) \subseteq A \setminus B$. 
Prove that if \( a|b \) and \( c|d \), then \( ac|bd \).
Show that if $x > 3$, then $x^2 - x > 6$. 
Verify that $\bigcap_{i \in I} (A_i \setminus B_i) = \left( \bigcap_{i \in I} A_i \right) \setminus \left( \bigcup_{i \in I} B_i \right)$

by writing out in sentence form.
Show that $(\exists x)(P(x) \vee Q(x))$ is logically equivalent to $(\exists x)P(x) \vee (\exists x)Q(x)$

Use the rule that $(\forall x)(P(x) \wedge Q(x))$ is logically equivalent to $(\forall x)P(x) \wedge (\forall x)Q(x)$
Show that $P \rightarrow (Q \rightarrow R)$ is logically equivalent to $(P \land Q) \rightarrow R$. 
Make Venn diagrams for the sets \((A \cup B) \setminus C\) and \(A \cup (B \setminus C)\).

Decide which set is necessarily a subset of the other.

Give an example where the two sets are different.
Write one or two alternative definitions for the following set:

\{1, 4, 9, 16, \ldots \}
Use the laws from the text to simplify \((P \land Q) \lor (P \land \neg Q)\).
Make a truth table for the formula $P \land (\neg P \lor Q)$.
Can you find a simpler formula which is equivalent to $P \land (\neg P \lor Q)$?

<table>
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<th>P</th>
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<th>$\neg P \lor Q$</th>
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