Problem Set 9
due Thursday, Nov 13

Please prove all your answers. Short and elegant proofs are encouraged but not required.

**Problem 1.** The set $X$ has $n$ elements, the set $Y$ has $m$ elements ($m$ and $n$ are natural numbers). How many functions from $X$ to $Y$ are there? Prove your answer by induction (induct on the parameter $n$).

**Problem 2.** Let $f : X \to Y$ be a function, $A, B \subseteq X$. Determine whether the following statements are true or false; give proofs or counterexamples.
(a) if $f(A) \subseteq f(B)$, then $A \subseteq B$.
(b) $f(A \cup B) = f(A) \cup f(B)$
(c) $f(A \cap B) = f(A) \cap f(B)$
(d) $f(A - B) = f(A) - f(B)$
(e) $f(\overline{A}) = \overline{f(A)}$

Please also do questions
4bde from section 3.2
3c, 6ce from section 3.3
9 from section 3.4
3be, 5c from section 4.4.