Exam I Study Questions

1.
Use induction to show that every postage of 8¢ or more can be made up by selecting suitable numbers of 3¢ and 5¢ stamps.

2.
True or false — for all sets X and Y the following set identities are valid (P(S) denotes the power set of a set S). If the identity *is* valid for all sets, provide a proof; if the identity is not valid for all sets, provide specific sets for which it fails.

(a) $\overline{X} \cup \overline{Y} = \overline{(X \cup Y)}$

(b) $P(X \cup Y) = P(X) \cup P(Y)$

3.
Consider the relation R on pairs of natural numbers defined by (m,n) R (p,q) if and only if m+n = p+q.

(a) show that R is an equivalence relation over N,

(b) determine the equivalence classes of (0,0) and (1,3).

4.
Provide an example of functions f,g: $N \to N$ which have the property that $f \circ g \neq g \circ f$.