MA 387 Exam 1 February 26, 1982

Name ______________________________

(20) 1. Prove that for all sets A, B and C,

$$C \subseteq A \cap B \text{ iff } (C \cap \overline{A}) \cup (C \cap \overline{B}) = \phi.$$

(10) 2. Show that for all sets A and B, $A^B \subseteq \mathcal{P}(B \times A)$.

(15) 3. Define a relation ρ on $\underline{Z}$ such that for all a, b $\in$ $\underline{Z}$

$$a \; \rho \; b \quad \text{iff} \quad a - b \text{ is divisible by } 5.$$

Show that ρ is an equivalence relation and describe the equivalence classes.

(35) 4. Suppose $f : \underline{R} \to \underline{R}$ such that for each $x \in \underline{R}$, $f(x) = 3 + 2x$.

(a) Show f is a bijection (1-1 and onto).

(b) Let $(0,1) = \{x \in \underline{R} | 0 < x < 1\}$. Calculate $f[(0,1)]$ and $f^{-1}[(0,1)]$.

(c) If $g : \underline{R} \to \underline{R}$ such that for each $x \in \underline{R}$, $g(x) = x^2$, calculate $f \circ g(2)$ and $g \circ f(2)$.

(20) 5. If $f \subseteq A \times B$, prove that f is a function iff $f \circ f^{-1} \subseteq i_B$.