MATH 210, Discussion 325 Quiz 1 February 4, 2008

Name:

Problem 1 (5 points): *Describe the following shaded region using the set operations of union, intersection, complement, and the sets A, B, and C:*

Solution: $\big((A \cap B) \cup (B \cap C) \cup (C \cap A)\big) \cap (A \cap B \cap C)'$

Problem 2 (5 points): *Let $A = \{a, b\}$, $B = \{1, 2, 3\}$, and $C = \{a, 1, 2\}$. Then*

$$(A \times B) \cap (C \times B) = ?$$

Solution:

$$\{(a, 1), (a, 2), (a, 3)\}$$

Problem 3 (5 points): *A set X that has 700 elements is partitioned into subsets X_1, X_2, X_3, and X_4. If $n(X_1) = n(X_4)+50$, $n(X_2) = 2 \cdot n(X_4)$, and $n(X_3) = n(X_1)+n(X_4)$, what is $n(X_3)$?*

Solution:

$$\begin{aligned} 700 &= n(X) \\ &= (n(X_4) + 50) + (2 \cdot n(X_4)) + (n(X_1) + n(X_4)) + n(X_4) \\ &= (n(X_4) + 50) + (2 \cdot n(X_4)) + ((n(X_4) + 50) + n(X_4)) + n(X_4) \\ &= 6 \cdot n(X_4) + 100. \end{aligned}$$

Thus,

$$\begin{aligned} 600 &= 6 \cdot n(X_4) \\ 100 &= n(X_4). \end{aligned}$$

Finally,

$$n(X_3) = n(X_1) + n(X_4) = (n(X_4) + 50) + n(X_4) = 2 \cdot n(X_4) + 50 = 2 \cdot 100 + 50 = 250.$$