MAT312/AMS351 Applied Algebra – Fall 2002
Quiz #4 with solutions
10/29/2002

Name:
SB ID:

Problems 1 & 2: True or false: (Circle the correct answers.) Let X, Y and Z be sets.

    T   F   (1) If $X \cap Y = \emptyset$, then either $X = \emptyset$ or $Y = \emptyset$.

    T   F   (2) $(X \cup Y)^c \cup Z = X^c \cup Y^c \cup Z$.

SOLUTION: (1) is FALSE. Let X be the set of even integers and y, the set of odd integers.

(2) is also FALSE. The set Z does not play any role in the problem, so you may take $Z = \emptyset$. Let Y be a proper subset of X. So the statemen in this case reads $X^c = Y^c$ which is clearly not true.

The next three problems involve the permutation

$$\pi = (1,2,3,6)(1,4,5)(8,9) \in S(10).$$

Problem 3: Write π as a product of disjoint cycles.

SOLUTION: $\pi = (1,4,5,2,3,6)(8,9)$.

Problem 4: Write π and π^{-1} as products of transpositions.

SOLUTION: $\pi = (1,6)(1,3)(1,2)(1,5)(1,4)(8,9)$ and

$\pi^{-1} = (8,9)(1,4)(1,5)(1,2)(1,3)(1,6)$.

Problem 5: What are the fixed points of π, the order of π, and the sign of π?

SOLUTION: The fixed points of π are 7 and 10.

$o(\pi) = \operatorname{lcm}(6,2) = 6$.

$\operatorname{sgn}(\pi) = (-1)^6 = 1$.