CISC-102 FALL 2016

Please work on these problems and be prepared to share your solutions with classmates in class next week. Assignments will **not** be collected for grading.

READINGS

Read sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, (in 3.3 you may skip the part on permutations) and 2.1, 2.2, 2.3 of *Schaum's Outline of Discrete Mathematics.*

Read section 2.1 again (If you did not understand things last week) of *Discrete Mathematics Elementary and Beyond.*

PROBLEMS

(1) Determine whether the mappings from $\mathbb{R}$ to $\mathbb{R}$ shown below are or are not functions, and explain your decision.
   (a) $f(x) = 1/x$
   (b) $f(x) = \sqrt{x}$
   (c) $f(x) = 3x - 3$
(2) Determine whether each of the following functions from $\mathbb{R}$ to $\mathbb{R}$ is a bijection, and explain your decision. HINT: Plotting these functions may help you with your decision.
   (a) $f(x) = 3x + 4$
   (b) $f(x) = -x^2 + 2$
   (c) $f(x) = x^3 - x^2$
(3) Consider the recursive function $T(1) = 1, T(n) = T(n-1) + 1$, for all $n \geq 2$.
   (a) Use the recursive definition to obtain values T(2), T(3), and T(4).
   (b) Using the values that you obtained for T(2), T(3), and T(4), to guess the value of T(n), and then prove that it is correct using induction.
(4) Consider the following relations on the set $A = \{1, 2, 3\}$:
   - $R = \{(1,1), (1,2), (1,3), (3,3)\}$,
   - $S = \{(1,1), (1,2), (2,1), (2,2), (3,3)\}$,
   - $T = \{(1,1), (1,2), (2,2), (2,3)\}$,
   - $A \times A$.

For each of these relations determine whether it is symmetric, antisymmetric, reflexive, or transitive.