MEDGAR EVERS COLLEGE
The City University of New York

CS 241: Discrete Structures
Diagnostic Examination

NAME: _____

EMAIL: _____

CURRENT MATH COURSE: _____

DIRECTIONS: Read the questions carefully and write neat literate solutions in the space provided.

1. Prove or disprove that if $x^2 - x - 6 \geq 0$, then $x \geq 3$.

2. Write the truth table for the following wff (well-formed formula):

$$[P \wedge (P \to Q)] \to Q$$

3. Find

$$\begin{bmatrix} 1 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} 4 & 2 \\ 3 & 5 \end{bmatrix}$$

4. How many different letter arrangements are there for the word HAPPY if
   (a) all the letters are distinct?
   (b) same letters are identical?

5. If $S = \{2, 3, 5\}$, write all the subsets of S

6. Suppose $T(n)$ be defined as follows:

$$T(n) = \begin{cases} 1 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ nT(n-2) & \text{if } n > 1 \end{cases}$$

   where n is a non-negative integer. Find
   1. $T(2)$
   2. $T(5)$
   3. $T(6)$
   4. $T(3)$