ECE 111 - Homework #1

Week #1: Algebra. Due 11am Tuesday, August 31st, 2021
Please submit as a Word or pdf file and email to Jacob_Glower@yahoo.com with header ECE 111 HW#1

functions *poly* and *roots*:

1) Use MATLAB, find the roots the the following polynomials:

a) $x^3 + 3x^2 + 6x + 12 = 0$

b) $x^4 + 3x^3 + 6x^2 + 12x + 24 = 0$

c) $x^5 + 3x^4 + 6x^3 + 12x^2 + 24x + 48 = 0$

2) Use Matlab to multiply our the following polynomials.

a) $(x+2)(x+3)(x+5)(x+7) = 0$

b) $(x+3)(x+6)(x+9)(x+12)(x+15)(x+18) = 0$

Graphing in Matlab

3) Plot the two functions in Matlab and determine all solutions in the range of -2 < x < +2

$y = \sin(3x)$

$y = x^2 - 1$

4) Plot the two functions in Matlab and determine all solutions in the range of 0 < x < 10

$y = 10 - x$

$y = 0.1\ e^{0.02x}$

Monte-Carlo Simulations:

Two teams, A and B, are playing a game. Team A has a 65% chance of winning any given game.

5) For Loops: Suppose the two teams play a 7-game match. The match winner is whoever has 4 wins or more. Determine the probability that team A will win the match.

hint: use a for-loop (for i=1:7) and count how many times team A wins during the 9-game match).

6) While Loops: Suppose the two teams play until one team is up by 4 games. Determine the probability that team A will win the match.

hint: use a while-loop and keep looping until one team is up by 4 games.

7) Gauss' Dilema: Play the following game 100 times. (i.e. use Matlab and a for loop along with a while loop)

- It costs $25 to play. The pot starts at $1.
- Flip a coin. If you get a heads, the pot doubles. If you get a tails, the game is over and you collect the money in the pot.
- Keep flipping until you get a tails.

How much money do you expect to win (or lose) each time you play this game?

Dice:

8a) Determine the probability distribution for the following:

- Roll a 4-sided die, a 6-sided die, an 8-sided die, a 10-sided die, and a 12-sided die.
- The total is the sum of all of the dice.

  $Y = d4 + d6 + d8 + d10 + d12$

8b) What is the probability of the total being 30?

8c) What is the probability of the total being 30 or more?

9) Determine whether you should bet on Player A or Player B:

- Player A rolls five dice and takes the total (d4 + d6 + d8 + d10 + d12)
- Player B rolls two 100-sided dice and takes the lower of the two numbers.
- Whoever has the highest score wins.