ECE 111 - Make-Up Homework #1

Week #1: Matlab Introduction - Due Friday, December 12th

Bison Academy: Homework Sets & Solutions

1) What are the two solutions to

$$y = x + \frac{1}{x}$$

$$y = 5$$

hint: See homework #2, problem #1 solutions for Spring 2025

Roots to a Polynomial

2) Use the *roots()* command to find the roots to

a) $y = x^3 + 13x^2 + 50x + 56$

b) $y = x^4 + 11x^3 + 41x^2 + 61x + 30$

c) $y = x^5 + 28x^4 + 305x^3 + 1610x^2 + 4104x + 4032$

Matlab as a Graphing Calculator:

Assume a thermistor (temperature sensitive resistor)and voltage divider have the following relationship:

$$R = 2000 \cdot \exp\left(\frac{4000}{T+273} - \frac{4000}{298}\right)\Omega$$

$$V = \left(\frac{R}{R+2000}\right) \cdot 10V$$

3) Determine the resistance and voltage if

- T = 5 degrees C (refrigerator)
- T = -20C (freezer)

4) Plot the resistance vs. temperature for -30C < T < +30C. From the graph, determine

- The temperature when R = 20,000 Ohms
- The temperature when R = 5,000 Ohms

5) Plot the votlage vs. temperature for -30C < T < +30C. From the graph, determine

- The temperature when V = 8.00 Volts
- The temperature when V = 6.00 Volts

For-Loops

6) A and B are playing a game of dice. For each game

- A rolls three 20-sided dice and takes the sum (A = 3d20)
- B rolls five 10-sided dice and takes the sum (B = 5d10).

Whoever has the higher total wins the game (A wins on ties). Determine the odds that A wins the game using a Monte-Carlo simulation with 100,000 games.

7) Instead of playing a single game of dice, A and B play a match consisting of 3 games. Determine the odds that A wins the match using a Monte-Carlo simulation with 100,000 games.

While-Loops

8) Instead of playing a match of 5 games, assume the match continues until one player is up 3 games. Determine the odds that A wins the match using a Monte-Carlo simulation with 100,000 games.

9) Instead of playing a match of 5 games, assume the match continues until one player is up 4 games. Determine the odds that A wins the match using a Monte-Carlo simulation with 100,000 games.