ECE 111 - Make-Up Homework #1

Week #1: Matlab Introduction

Bison Academy: Homework Sets & Solutions

1) What are the solutions to

$$y = \cos(3x)$$

$$y = (x+1)(x-2)$$

hint: See homework #2, problem #2 solutions for Fall 2024

Roots to a Polynomial

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

a) $y = x^3 - 5x^2 - 196x + 980$

b) $y = x^4 - 36x^3 + 469x^2 - 2610x + 5200$

c) $y = x^5 - 5x^4 - 97x^3 + 641x^2 + 480x - 6300$

Matlab as a Graphing Calculator:

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

$$R = 5000 \cdot \exp\left(\frac{4100}{T+273} - \frac{4100}{298}\right) \Omega$$

$$V = \left(\frac{R}{R+2000}\right) \cdot 5V$$

3) Determine the resistance and voltage if
- T = 10 degrees C (tap water)
- T = 30C (hot water)

4) Plot the resistance vs. light level for 0 <T < 50. From the graph, determine
- The temperature when R = 12000 Ohms
- The temperature when R = 6000 Ohms

5) Plot the votlage vs. light level for 0 < T < 50. From the graph, determine
- The temperature when V = 4.00 Volts
- The temperature when V = 3.00 Volts

For-Loops

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

- A rolls four 8-sided dice and takes the sum (A = 4d8)
- B rolls three 12-sided dice and takes the sum   (B = 3d12).

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 5 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 two games. Determine the odds that A wins the match using a Monte-Carlo simulation with 100,000 games.

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