ECE 111 - Make-Up Homework #2

Week #2: Algebra 1

Newton's Method

Problems 1 & 2) Let x and y be related by:

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

1) Use graphical methods solve for x when

- y = -0.5
- y = +0.5

2) Find the solutions to problem #1 using Newton's method

Problems 3 & 4) Let x and y be related by

$$y = \cos(2x)$$

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

3) Find all solutions in the range of (-4 < x < 4) using graphical methods. (Plot both functions on the same graph. The solution is when the two functions intersect.)

4) Find the solutions to problem #3 using Newton's method.

Newton's Method with a Temperature Sensor

Assume the light - resistance relationship of a temperature sensor is:

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

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T = [0:0.01: 50]';
R = 5000 * exp(4100 ./ (T + 273) - 4100/298);
plot(T,R)
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5) Use Newton's method to find the temperature when

- R = 12,000 Ohms
- R = 6,000 Ohms

6) Determine how many iterations are required to get the answer within

- 1 degree C
- 0.001 degree C
- 0.000 001 degree C

Newton's Method and a Voltage Divider

Assume

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

7) Use Netwon's method to determine the temperature when

- V = 4.00V
- V = 3.00V