

ECE 111 - Homework #2

Math 103 - Algebra, Functions & Solving $f(x) = 0$. Due Monday, September 4th
Please submit via BlackBoard

Newton's Method

1) Let x and y be related by:

$$y = x^3 - x^2 - 6x + 1$$

Use Newton's method to solve for x when

- $y = 0$
- $y = 10$

2) Let x and y be related by

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

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

Find all solutions using graphical methods. (Plot both functions on the same graph. The solution is when the two functions intersect.)

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

Let

$$y_1 = \sin(2x)$$

$$y_2 = (x + 1)(x - 1)$$

$$e = y_1 - y_2$$

Find the solutions for $f(x) = 0$ using Newton's method.

(over)

Newton's Method with a Thermistor

Assume the temperature - resistance relationship of a thermistor is:

$$R = 1000 \cdot \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

$$e = R - R_0$$

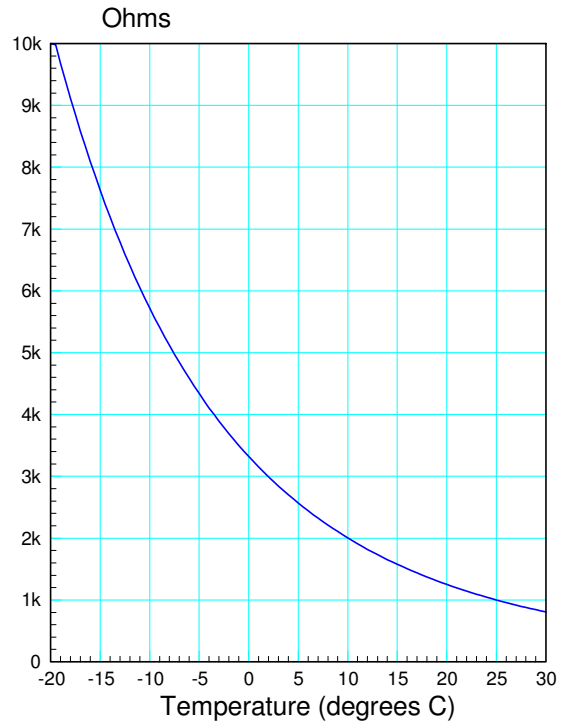
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T = [-20:0.5:30]';  
R = 1000*exp( 3905./(T+273) - 3905/298 );  
plot(T,R);
```

4) Write a Matlab function which

- Is passes the temperature T, and
- Returns e (the difference between R and R0)

5) Use Newton's method to find the temperature when

- R0 = 2000 Ohms
- R0 = 5000 Ohms



Newton's Method and a Voltage Divider

Assume

$$R = 1000 \cdot \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

$$V = \left(\frac{R}{R+1000}\right) \cdot 10V$$

$$e = V - V_0$$

6) Write a Matlab function which

- Is passed the temperature, T, and
- Returns the error, e.

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

- V0 = 8.00V
- V0 = 6.00V

