

ECE 111 - Homework #2

Week #2: Algebra

Newton's Method

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

$$y = \frac{1}{5} \cdot x^2 + 2 \sin(1.4x)$$

- 1) Use graphical methods to plot x vs. y for $-5 < x < 5$. Using graphical methods, find x when $y = +3$
- 2) Find the solutions to problem #1 using Newton's method

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

$$y = \sin(1.7x)$$

$$y = \frac{1}{5} \cdot (x^2 - 1)$$

- 3) Find all solutions in the range of $(-5 < x < 5)$ 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 temperature - resistance relationship of a sensor is:

$$R = 3000 \cdot \exp\left(\frac{3500}{T+273} - \frac{3500}{298}\right) \Omega$$

$$V = \left(\frac{R}{R+10,000}\right) 10V$$

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T = [-20:0.01:20]';  
R = 3000 * exp(3500 ./ (T + 273) - 3500/298);  
V = R ./ (R + 10000) * 10;  
plot(T,R)  
plot(T,V)
```

- 5) Use Newton's method to find the temperature when
 - $R = 15,000$ Ohms
 - $R = 5,000$ Ohms
- 6) Use Newton's method to determine the temperature when
 - $V = 6.00V$
 - $V = 4.00V$