Topic: Linearizing a non-linear model.
Read:. Ch14: **14.4** Ch 15: example 15.4 Ch 16: 16.1, 16.2
Download `rsquaredF.m` and use it as needed
Create a plot for every problem unless otherwise instructed. All plots should include data points (use a marker) and curve fit (use a solid line; with different colors & legend when more than one curve fit). Label and title all plots!

Handwork problem :

HW9_1 Linearize the model $y = \alpha\, x\, e^{\beta x}$ and solve for the coefficients by hand using the following data

x	0.1	0.2	0.4	0.6	0.9	1.3	1.5	1.7	1.8
y	0.75	1.25	1.45	1.25	0.85	0.55	0.35	0.28	0.18

Coding problems:

HW9_2 (repeat of HW8_3) Fit a least-squares sinusoidal model

$$y = A_0 + A_1 \cos(\omega_0 t) + B_1 \sin(\omega_0 t)$$

Then use the model to determine the mean temperature, the high and low temps, and time of day at which they occurred. Print these results to the screen using fprintf.

Time of day	12 mid	2 am	4 am	6 am	8 am	10 am	Noon	2 pm	4pm	6pm	8pm	10pm	12 mid
t	0	2	4	6	8	10	12	14	16	18	20	22	24
Temp (F)	71.1	69.1	66.0	69.1	73.0	79.0	86.0	93.0	96.1	93.9	91.0	82.9	82.0

HW9_3 The following data set represents the growth rate of bacteria *k* (per d) as a function of oxygen concentration *c* (mg/L) and can be modeled by the equation $k = \frac{k_{max}\ c^2}{(c_s + c^2)}$

c (mg/L)	0.5	0.8	1.5	2.5	4.0
k (/day)	1.1	2.5	5.3	7.6	8.9

Linearize & solve for the linearized model coefficients using a MATLAB built-in function. Plot the straight line along with the linearized data. Next, determine the coefficients for the original model, and then create a second figure showing the original data points, and the model function. Place a title on each figure & label axes. Compute r^2 for both the linearized fit and the growth model fit and place it on the plots with the `text` command.

HW9_4 The Joule effect relates power to current flowing in a conductor. Data is shown in the table below:

Current (A)	0.5	1.25	1.50	2.25	3.00	3.20	3.50
Power (W)	1.20	7.50	11.25	25.00	45.00	50.00	65.00

Use MATLAB to find a best-fit equation to the data trend. Try several possibilities—linear, parabolic and a power model, and include r^2 in your analysis. Use the best equation to predict the power when current is 4A. Plot the equation out to 4A & print the answer with `fprintf`.

HW9_5 The file `CO2.txt`, found on Blackboard with this assignment, contains 50 numbers, which represent the concentration of atmospheric carbon dioxide (parts per million) recorded at Mauna Loa, HI on May 15th of each year from 1961 through 2010, (with background level CO_2 removed). **Fit an exponential model**. Use the model to predict the CO_2 value for May 15, 2015. Print the result to the screen using `fprintf`. The actual value was 125.1ppm. http://scrippsco2.ucsd.edu/data/atmospheric_co2