

CHE 205
Homework Set 2
Due: Sept 10, 2015

To complete this homework assignment, turn in a text (or Word, or PDF) file containing the MATLAB code that you generate in response to each problem.

1. Write a script that asks for a vector as user input and then prints out the elements of the vector in sentence format. For instance if the vector is [5.5 11.3 4.35], the script will display the following:

```
Element 1 is 5.5.  
Element 2 is 11.3.  
Element 3 is 3.45.
```

The script should work regardless of how many elements are in the vector.

2. The inverse of the mathematical constant e can be approximated as:

$$\frac{1}{e} \approx \left(1 - \frac{1}{n}\right)^n$$

as n approaches infinity. Write a script that will loop through increasing values of n until the difference between this approximation and the actual value is less than 0.0001. The script should then display the actual value of e^{-1} and the approximation to four decimal places, and also display the value of n required to achieve such accuracy.

3. In thermodynamics, the Carnot efficiency is the maximum possible efficiency of a heat engine operating between two reservoirs at different temperatures. The Carnot efficiency is given as:

$$\eta = 1 - \frac{T_C}{T_H}$$

where T_C and T_H are the absolute temperatures of the cold and hot reservoirs, respectively. Write a script that will prompt the user for the two reservoir temperatures in Kelvin and print the corresponding Carnot efficiency to three decimal places. The script should error-check the user's input since absolute temperature cannot be less than or equal to zero. The script should also swap the temperature values if T_H is less than T_C .