Laboratory 01: Analysis of Historical Gas Price Data

Learning Objectives:
- Use variables, operators, and control structures to implement simple sequential algorithms
- Use Matlab m-files to create user-defined programs and functions
- Develop simple logical algorithms to solve engineering problems
- Test program output for accuracy using hand calculations and debugging techniques
- Distill numerical results into a readable format that answers specific civil engineering analysis and design questions

Topics/Outline:
1. Introduce the problem
2. Work together to download and format dataset #1
3. Demonstrate key elements of formatting dataset#2
4. Complete the programming assignment
Program 1: Gas Price Data.

Data from Bureau of Labor and Statistics.
Download data, load into Matlab, plot.

Challenge:

Work is $ adjusted for inflation.
→ Use Consumer Price Index data from Bureau of Labor and Statistics. → use eq^n in handout.
• Walk students through 1st dataset.
• Explain Memo template.
• Let students work on 2nd dataset and plotting alone
.m-files:
Matlab executes everything stored in a .m file one line after the other as if the commands were entered in the command window.
Use % to add comments.
We will call these files programs.

Built-in Functions:
Type:
  » help elfun; for a basic list.

Plotting:
% create the data
  x = 0:0.01:10;
y = 4*exp(0.3*x) + 50*exp(-x);
% plot data
  plot (x, y, 'r--', 'LineWidth', 1)
  data line type optional
     (red, dashed) attributes.
% see help plot.
Plotting:

Markup functions:

```
axis ([xmin xmax ymin ymax])
xlabel
ylabel
title
legend
subplot
hold on hold off
```

Saving Plots:

For editing:
```
>> save fname.fig
```

For plotting:
```
>> print -dtiff -r350 fname.tif
```
**Disp**: echo to screen during program execution.

```matlab
>> disp('my message'); disp(x)
```

**printf**: formattable display function.

```matlab
>> fprintf('Speed = %6.2f m/s \n', x)
```

**printf, cont**

```matlab
>> fprintf('Speed = %6.2f m/s \n', x)
```

- `f` = decimal value
- `d` = integer
- `e` = scientific notation
- `g` = let Matlab choose `f` or `e`.

Alerts Matlab a number will be displayed

```
Saves at least 6 characters
```

```
Displays 2 decimal places
```

```
Indicate carriage return (new line)
```