

```

name = 'Name: Tharusha Nayana Jayaweera';
id = 'ID: 103821592';
report = 'Lab 09';
disp(name);disp(id);disp(report);

```

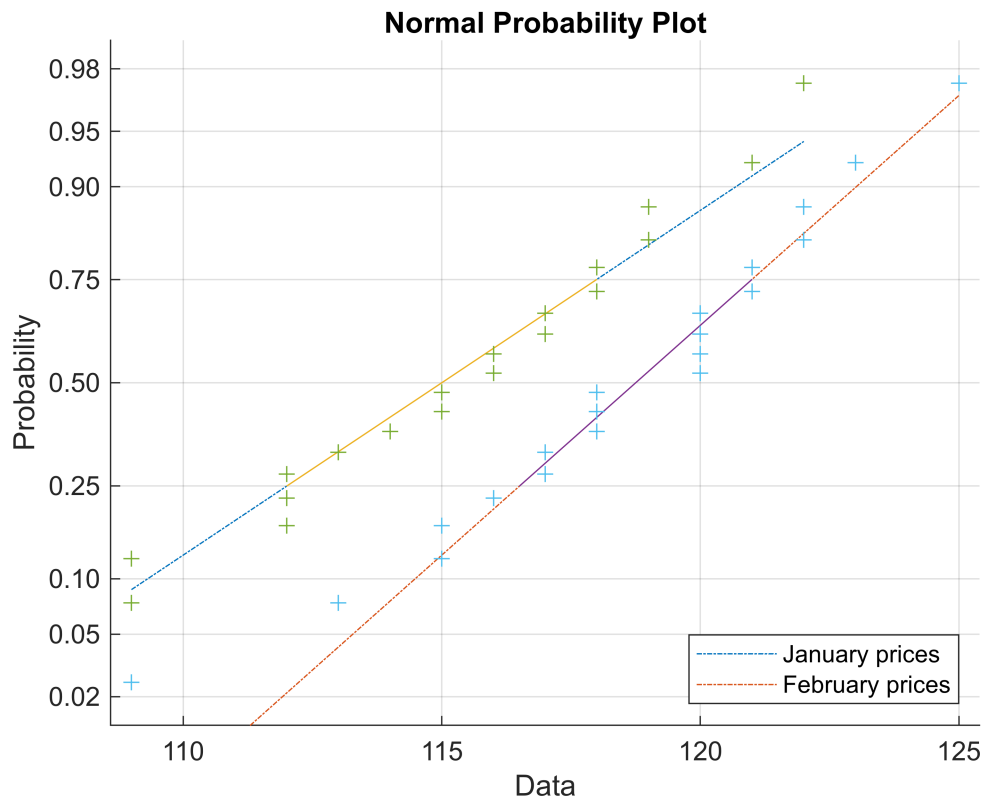
Name: Tharusha Nayana Jayaweera
 ID: 103821592
 Lab 09

```

load gas;
prices = [price1, price2];

figure;
normplot(prices);
legend({'January prices', 'February prices'}, 'Location', 'southeast')
title('Normal Probability Plot');

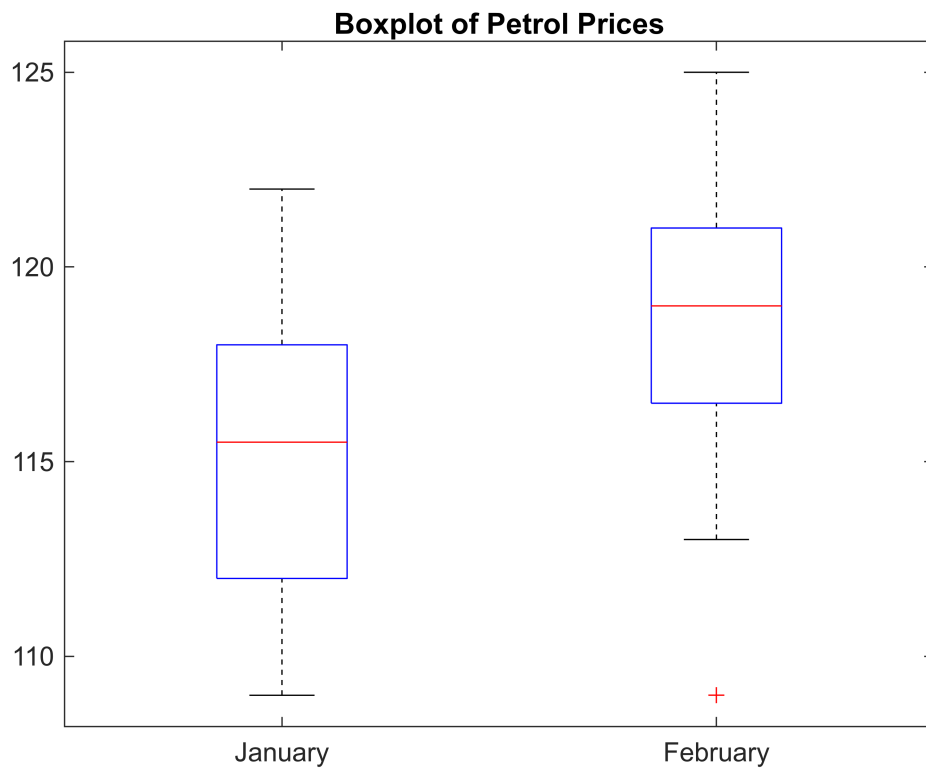
```



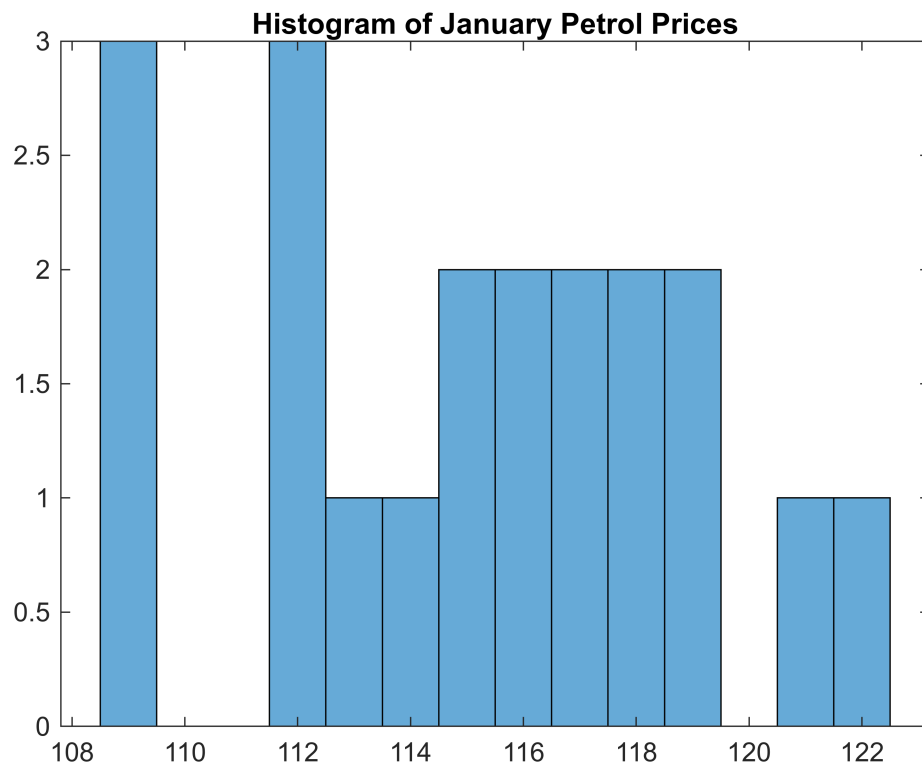
```

figure;
boxplot(prices);
xticklabels({'January', 'February'});
title('Boxplot of Petrol Prices');

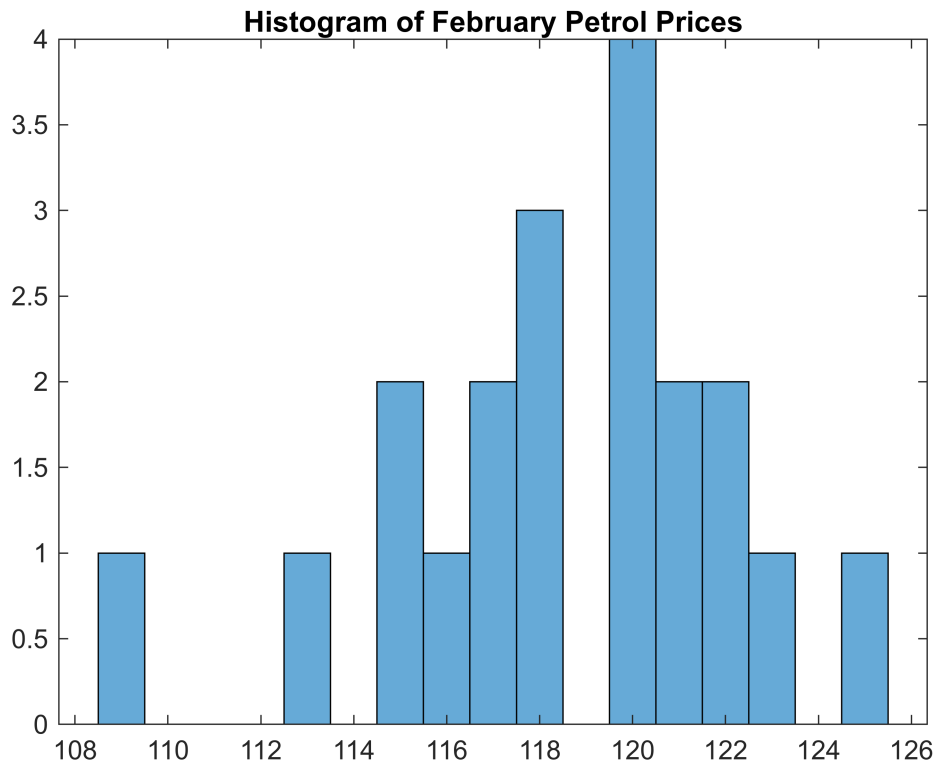
```



```
figure;  
histogram(price1);  
title('Histogram of January Petrol Prices');
```



```
figure;  
histogram(price2);  
title('Histogram of February Petrol Prices');
```



```
january_mean = mean(price1);  
february_mean = mean(price2);  
  
january_std = std(price1);  
february_std = std(price2);  
  
january_size = length(price1);  
february_size = length(price2);  
  
disp('Mean of January prices:');disp(january_mean);
```

```
Mean of January prices:  
115.1500
```

```
disp('Mean of February prices:');disp(february_mean);
```

```
Mean of February prices:  
118.5000
```

```
disp('Standard deviation of January prices:');disp(january_std);
```

```
Standard deviation of January prices:  
3.8699
```

```
disp('Standard deviation of February prices:');disp(february_std);
```

Standard deviation of February prices:
3.7346

```
disp('Sample size of January prices:');disp(january_size);
```

Sample size of January prices:
20

```
disp('Sample size of February prices:');disp(february_size);
```

Sample size of February prices:
20

```
disp('We observe that the price data is approximately normal in each case, with the  
normal QQ-plot showing the data lying on straight lines.');
```

We observe that the price data is approximately normal in each case, with the normal QQ-plot showing the data lying

```
disp('The boxplots show that the February price2 data appears to be somewhat higher  
than the January price1 data, but the ranges overlap. This is confirmed by the mean  
values.');
```

The boxplots show that the February price2 data appears to be somewhat higher than the January price1 data, but the

```
disp('The standard deviations for the two sets of data are very different.');
```

The standard deviations for the two sets of data are very different.

```
disp('Both samples have size 20.');
```

Both samples have size 20.

```
disp('We should model our data with the t-distribution as we have samples of size  
20 that are normally distributed.');
```

We should model our data with the t-distribution as we have samples of size 20 that are normally distributed.

```
% Confidence intervals
```

```
n = 20;  
nu = n - 1;  
alpha = 0.05;  
pLow = alpha / 2;  
pHigh = 1 - alpha / 2;  
tval = tinv([pLow pHigh], nu);  
  
january_xbar = mean(price1);  
january_se = std(price1) / sqrt(n);
```

```

january_ci = january_xbar + tval * january_se;

february_xbar = mean(price2);
february_se = std(price2) / sqrt(n);
february_ci = february_xbar + tval * february_se;

disp('Confidence Intervals:');

```

Confidence Intervals:

```

disp(['January data has a 95% confidence interval of ', num2str(january_ci(1)), ',
', num2str(january_ci(2)), '']);

```

January data has a 95% confidence interval of [113.3388, 116.9612]

```

disp(['February data has a 95% confidence interval of ', num2str(february_ci(1)),
', ', num2str(february_ci(2)), '']);

```

February data has a 95% confidence interval of [116.7521, 120.2479]

```

disp('These confidence intervals just barely overlap.');
```

These confidence intervals just barely overlap.

```

% Hypothesis tests
[h1, p1, ci1] = ttest(price1);
[h2, p2, ci2] = ttest(price2);

disp('Hypothesis Tests:');

```

Hypothesis Tests:

```

disp(['Result of comparing January prices with a mean of 0: p-value = ',
num2str(p1)]);

```

Result of comparing January prices with a mean of 0: p-value = 1.105e-29

```

disp(['Result of comparing February prices with a mean of 0: p-value = ',
num2str(p2)]);

```

Result of comparing February prices with a mean of 0: p-value = 3.2625e-30

```

disp('Since p-values are both less than the significance level (0.05), we reject
the null hypothesis that the means are equal.');
```

Since p-values are both less than the significance level (0.05), we reject the null hypothesis that the means are equal.