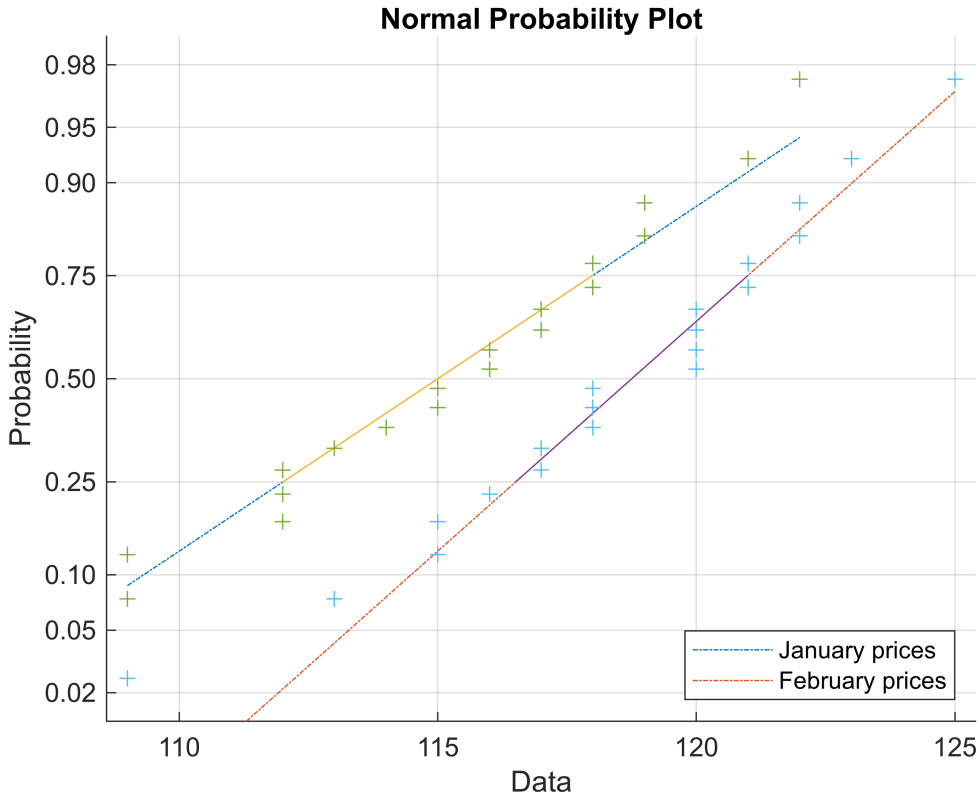
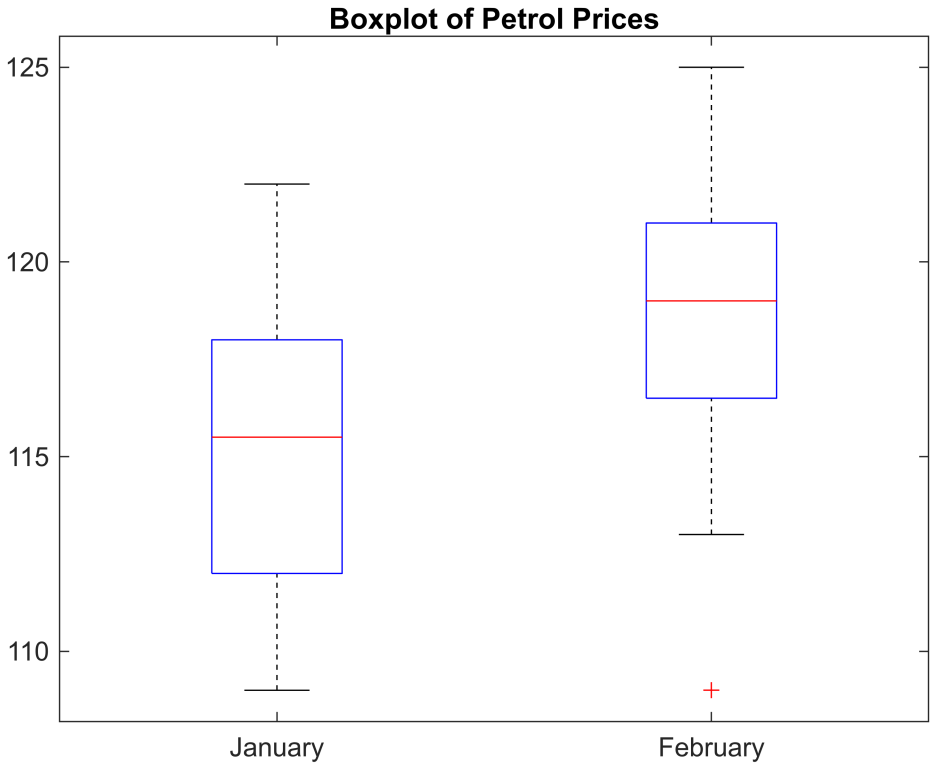
```
name = 'Name: Thenura Dulnath Kuruppuarachchi';
id = 'ID: 103512993';
report = 'Lab 09';
disp(name);disp(id);disp(report);
```

```
Name: Thenura Dulnath Kuruppuarachchi
ID: 103512993
Lab 09
```

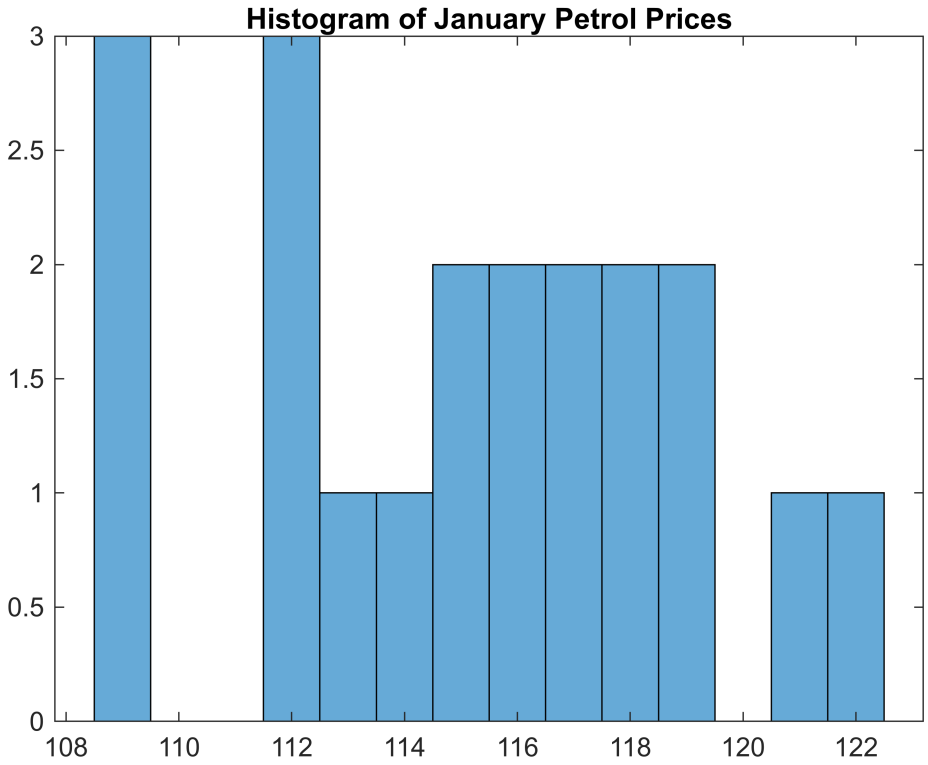
```
load gas;
prices = [price1, price2];

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



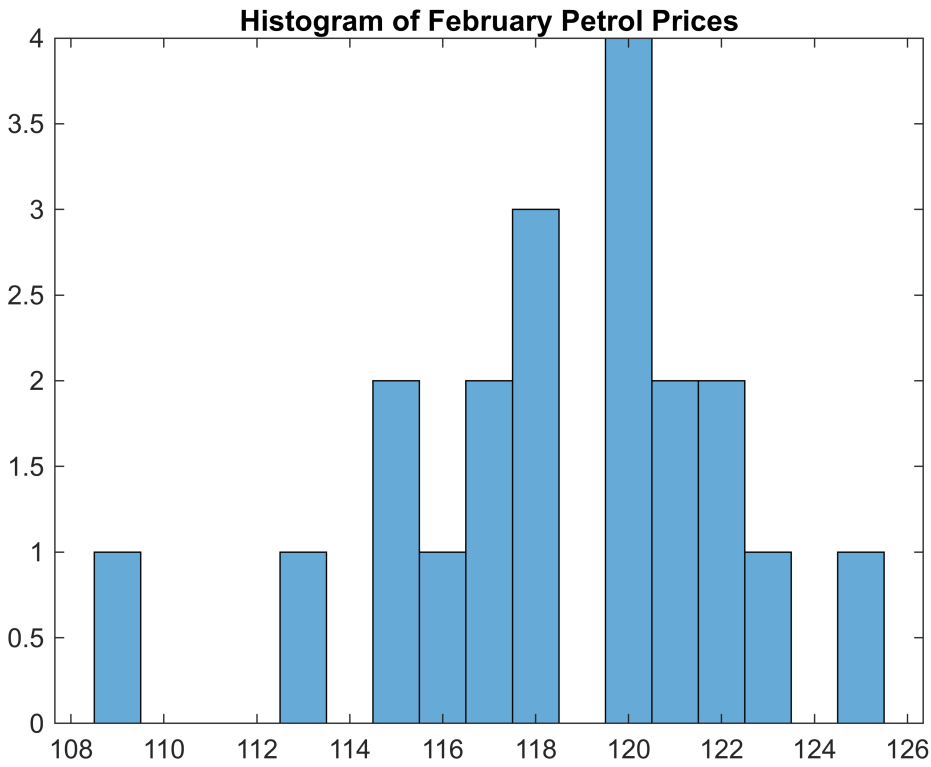

```
figure;
boxplot(prices);
xticklabels({'January','February'});
title('Boxplot of Petrol Prices');
```




```
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 eq
```