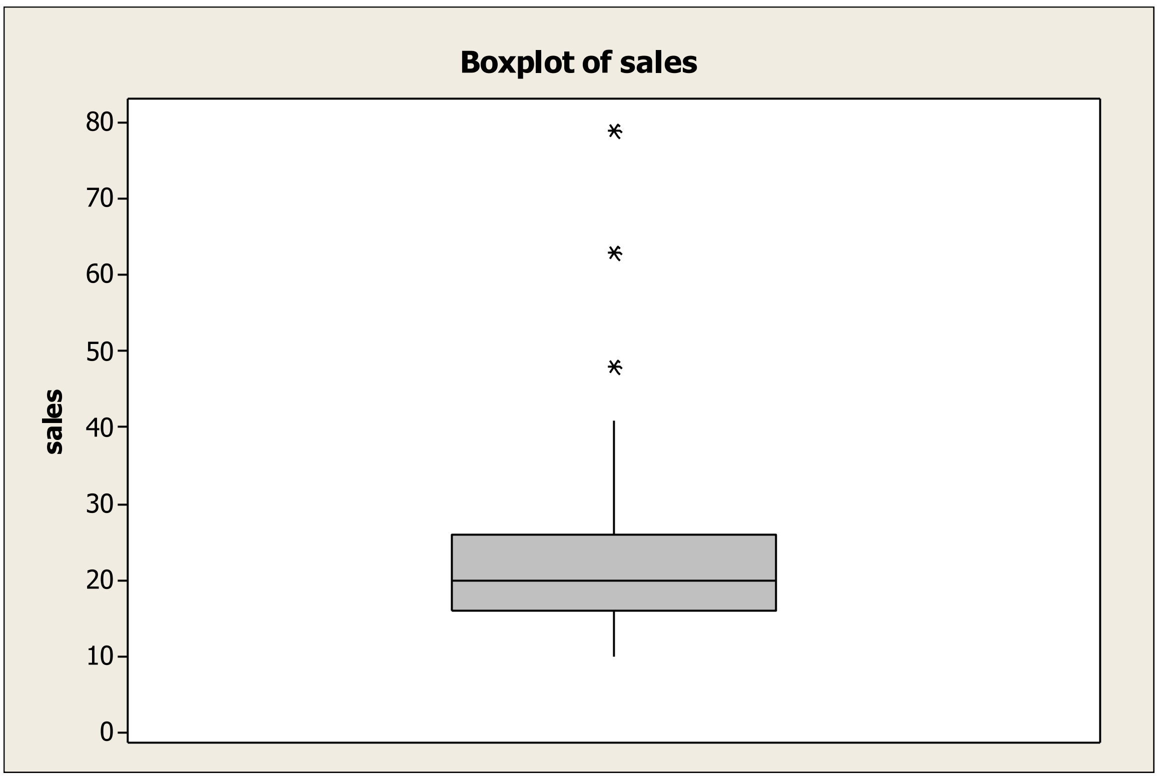
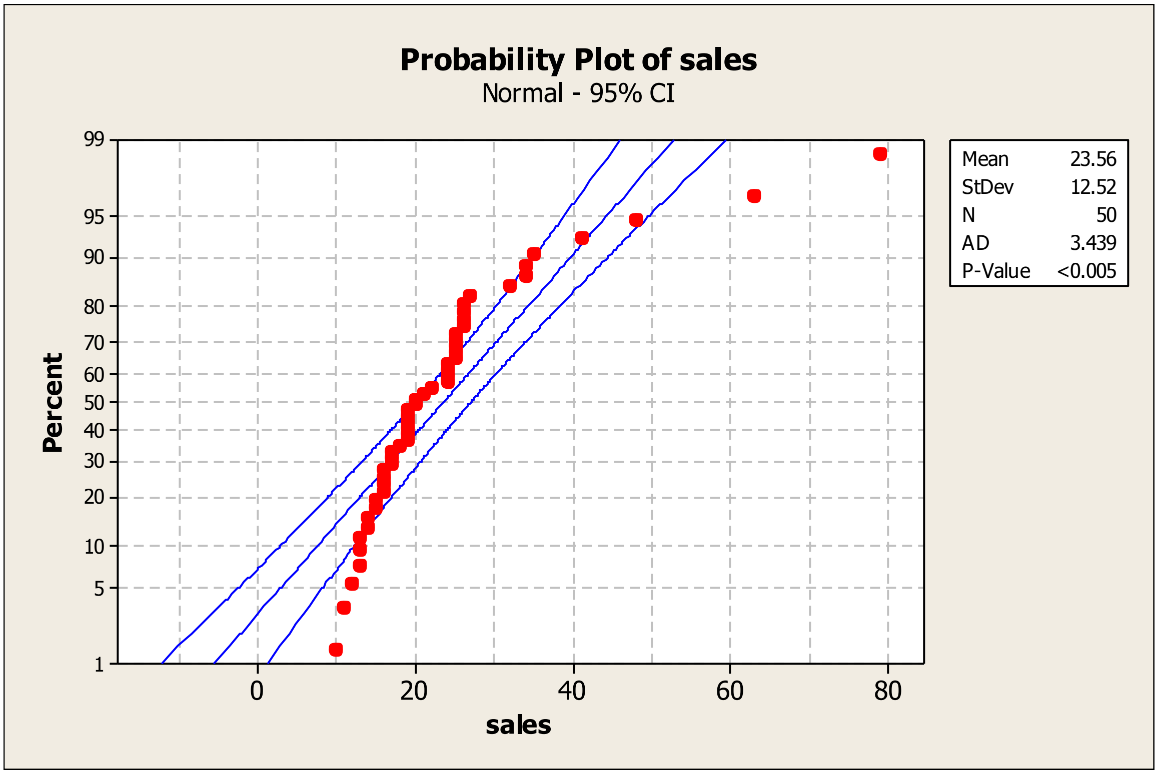
**Problem 1.**

(a)

```
Stem-and-leaf of sales  N  = 50
Leaf Unit = 1.0


 8   1  01233344
 24  1  5566667778999999
(8)  2  00124444
 18  2  5555566667
 8   3  244
 5   3  5
 4   4  1
 3   4  8
 2   5
 2   5
 2   6  3
 1   6
 1   7
 1   7  9
```





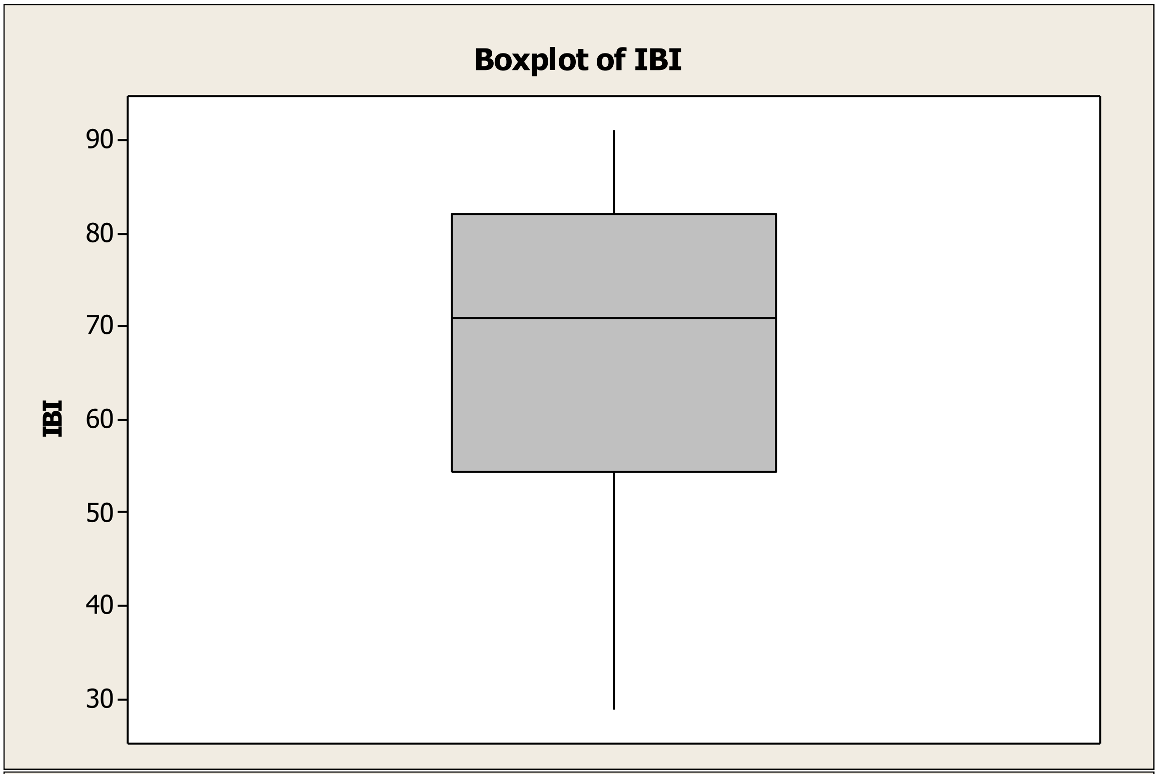

(b) **One-Sample T: sales**

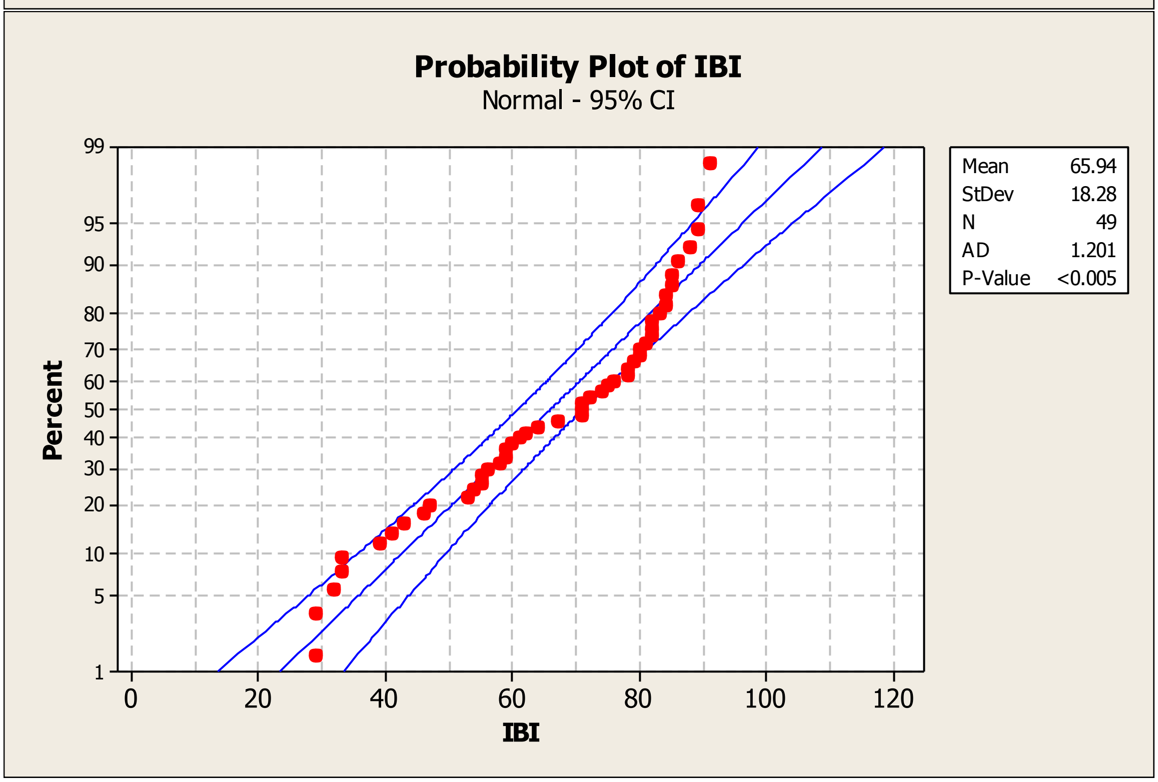
```
Variable    N    Mean  StDev  SE Mean       95% CI
sales      50   23.56  12.52     1.77  (20.00, 27.12)
```

**Problem 2.**

(a) **Stem-and-Leaf Display: IBI**

```
Stem-and-leaf of IBI  N  = 49
Leaf Unit = 1.0


 2    2   99
 5    3   233
 6    3   9
 8    4   13
 10   4   67
 12   5   34
 18   5   556899
 22   6   0124
 23   6   7
(5)   7   11124
 21   7   56889
 16   8   001222344
 7    8   556899
 1    9   1
```




There is no outlier present in the box plot, but very few outliers can be found in the probability plot.
The distribution skewed right.

I think t procedure should be used to analysis these data. This data has very few outliers and has a skewed shape; t test is robust for this kind of data, so we should use it.

(b) **One-Sample T: IBI**

| Variable | N | Mean | StDev | SE Mean | 95% CI |
|---|---|---|---|---|---|
| IBI | 49 | 65.94 | 18.28 | 2.61 | (60.69, 71.19) |

**Problem 3.**

(a) **Paired T-Test and CI: Jockos, Other**

Paired T for Jockos - Other

| | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| Jockos | 10 | 1216 | 550 | 174 |
| Other | 10 | 1136 | 521 | 165 |
| Difference | 10 | 80.0 | 84.6 | 26.7 |

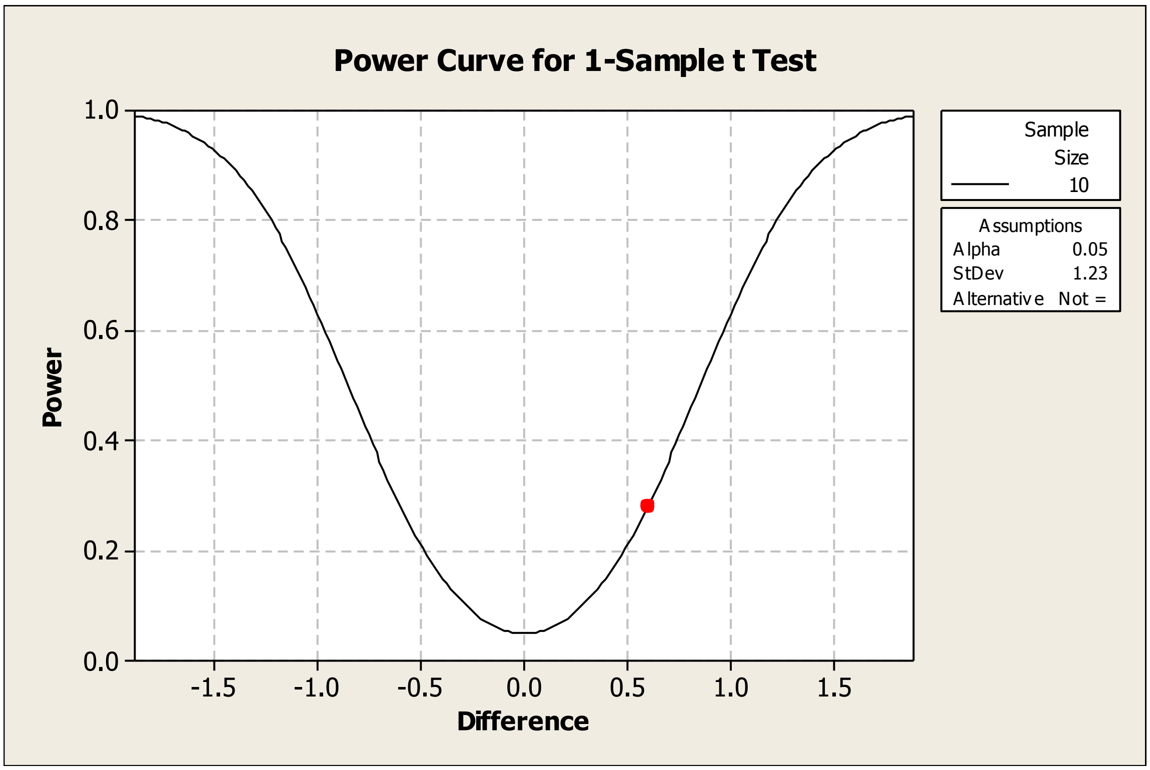
95% CI for mean difference: (19.5, 140.5)
T-Test of mean difference = 0 (vs not = 0): T-Value = 2.99  P-Value = 0.015

The null hypothesis is $\mu=0$ and alternative hypothesis is $\mu\neq0$. The degrees of freedom are both 9. The P-value is 0.015, so we do not reject the null hypothesis. We can conclude there is no difference between these two garages.

**Problem 4.**

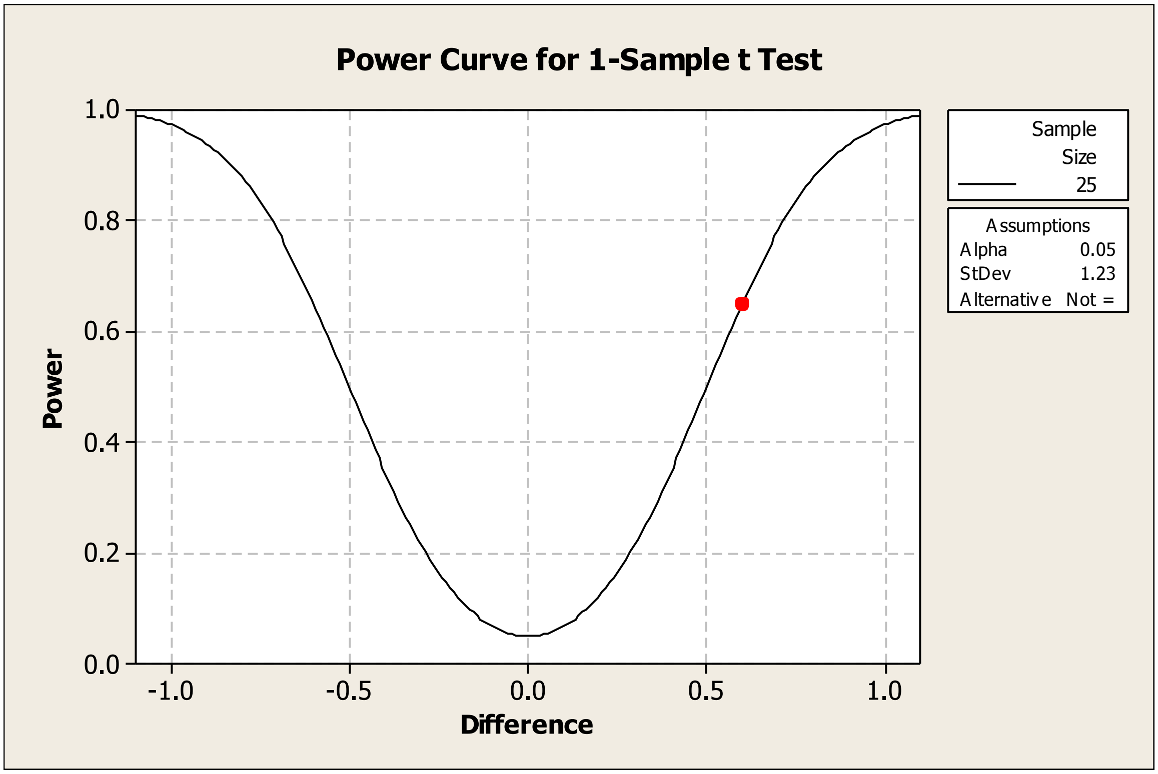
(a) **Power and Sample Size**

```
1-Sample t Test

Testing mean = null (versus not = null)
Calculating power for mean = null + difference
Alpha = 0.05  Assumed standard deviation = 1.23


            Sample
Difference    Size     Power
       0.6      10  0.281539
```



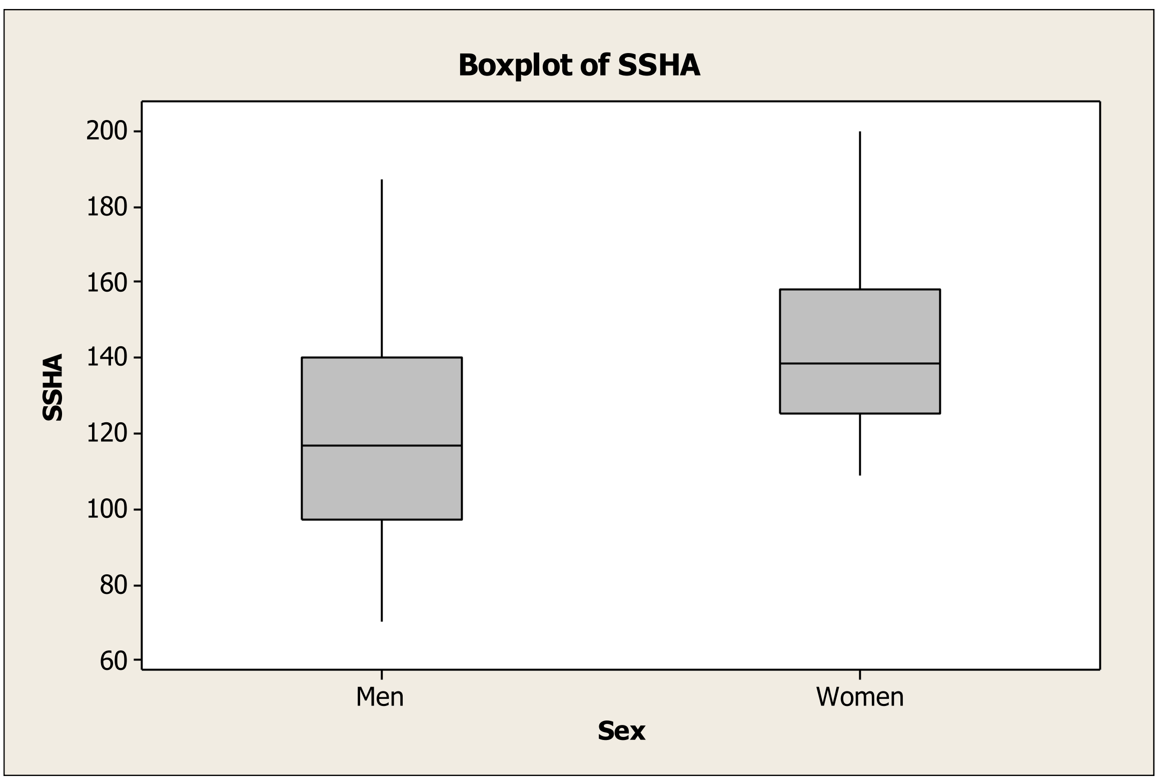

(b) **Power and Sample Size**

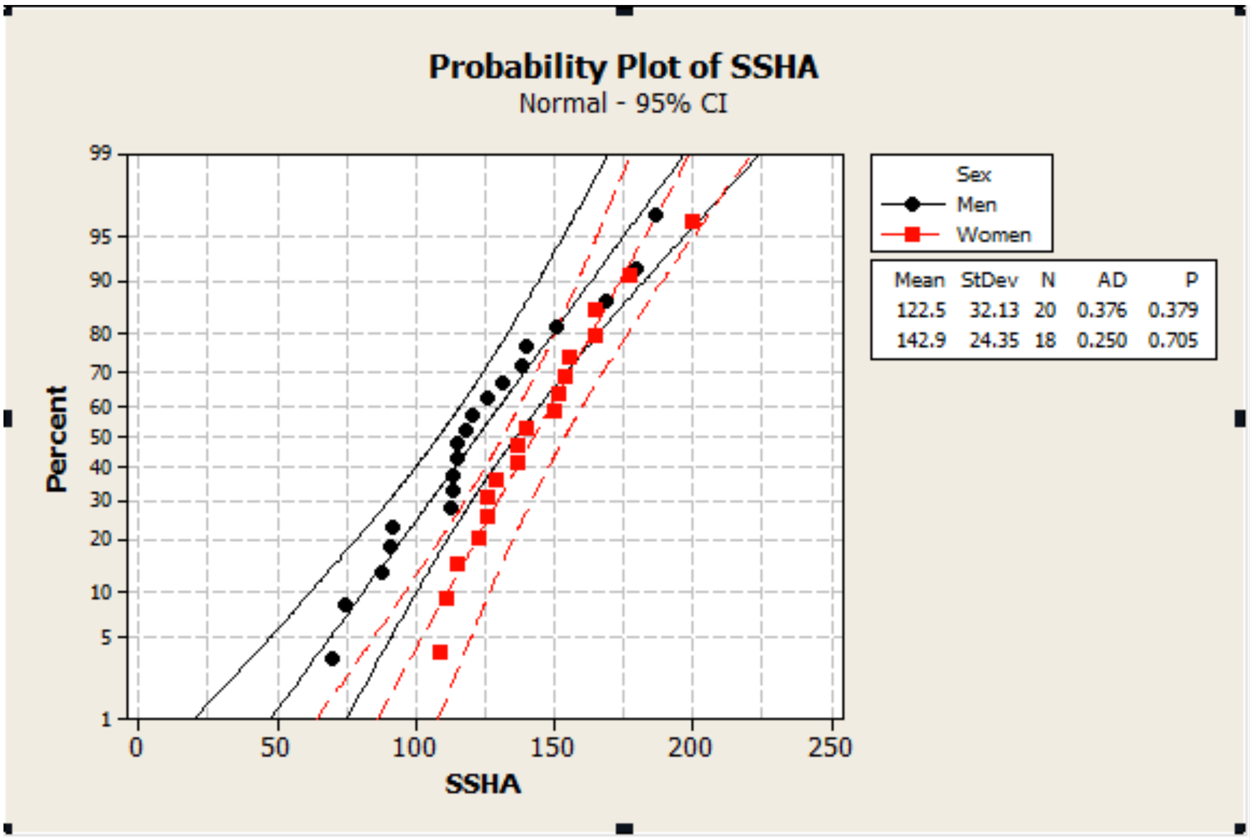
```
1-Sample t Test

Testing mean = null (versus not = null)
Calculating power for mean = null + difference
Alpha = 0.05  Assumed standard deviation = 1.23


            Sample
Difference    Size     Power
       0.6      25  0.648278
```


Power Curve for 1-Sample t Test
Power
Difference
1.0
0.8
0.6
0.4
0.2
0.0
-1.0
-0.5
0.0
0.5
1.0
Sample Size
25
Assumptions
Alpha 0.05
StDev 1.23
Alternative Not =

**Problem 5.**

(a)


Boxplot of SSHA
SSHA
200
180
160
140
120
100
80
60
Men
Women
Sex




From the boxplot and probability plot, we can tell there are no outliers, and the skew shapes of these two groups are almost the same. Therefore, the use of t procedure is acceptable.

(b) $H_0$: $u_{men} = u_{women}$

$H_a$: $u_{men} = u_{women}$

**Two-Sample T-Test and CI: SSHA, Sex**

```
Two-sample T for SSHA

Sex      N   Mean  StDev  SE Mean
Men     20  122.5   32.1      7.2
Women   18  142.9   24.4      5.7


Difference = mu (Men) - mu (Women)
Estimate for difference:  -20.44
95% upper bound for difference:  -4.91
T-Test of difference = 0 (vs <): T-Value = -2.22  P-Value = 0.016  DF = 35
```

The P-value is smaller than 0.05, we reject the null hypothesis $H_0$. The mean SSHA score for men is lower than women.

(c) **Two-Sample T-Test and CI: SSHA, Sex**

```
Two-sample T for SSHA

Sex     N   Mean  StDev  SE Mean
Men    20  122.5   32.1      7.2
Women  18  142.9   24.4      5.7


Difference = mu (Men) - mu (Women)
Estimate for difference:  -20.44
90% upper bound for difference:  -8.43
T-Test of difference = 0 (vs <): T-Value = -2.22  P-Value = 0.016  DF = 35
```

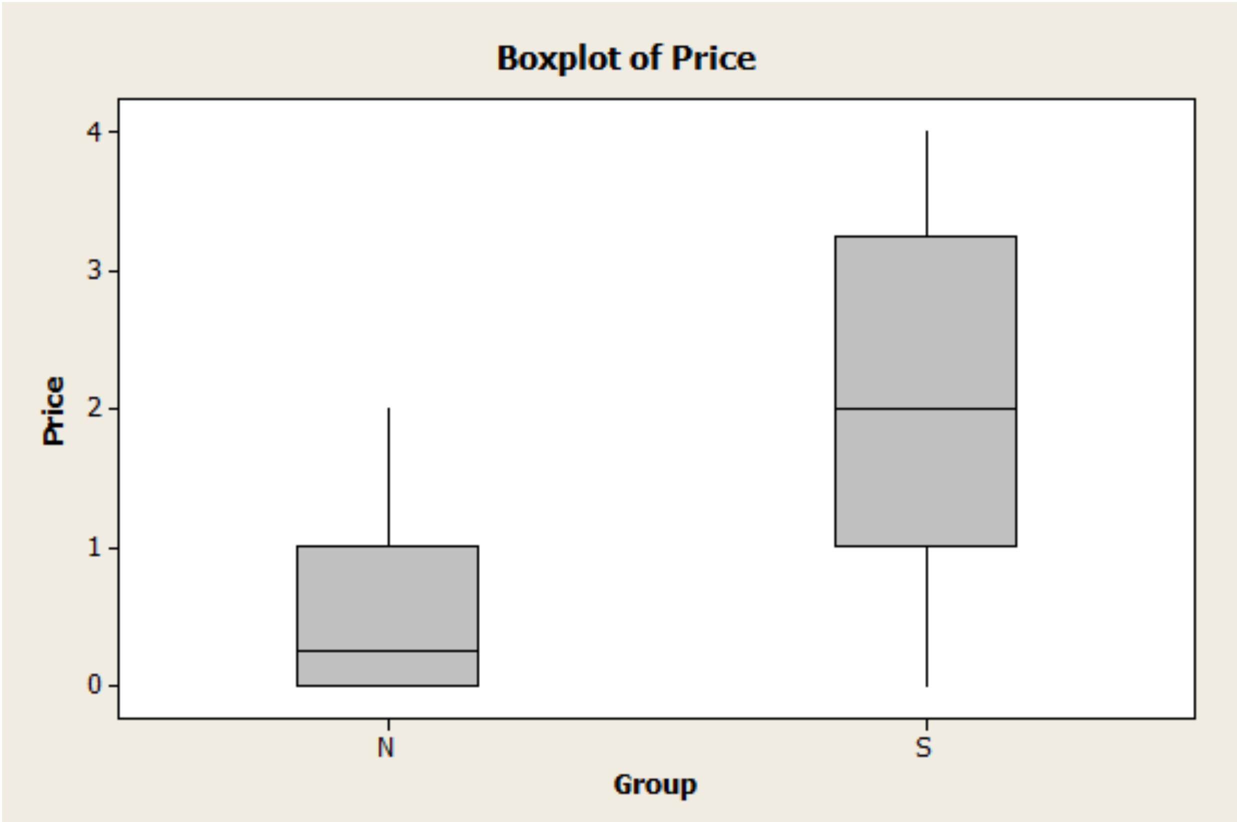
**Two-Sample T-Test and CI: SSHA, Sex**

```
Two-sample T for SSHA

Sex     N   Mean  StDev  SE Mean
Men    20  122.5   32.1      7.2
Women  18  142.9   24.4      5.7


Difference = mu (Men) - mu (Women)
Estimate for difference:  -20.44
90% lower bound for difference:  -32.46
T-Test of difference = 0 (vs >): T-Value = -2.22  P-Value = 0.984  DF = 35
```

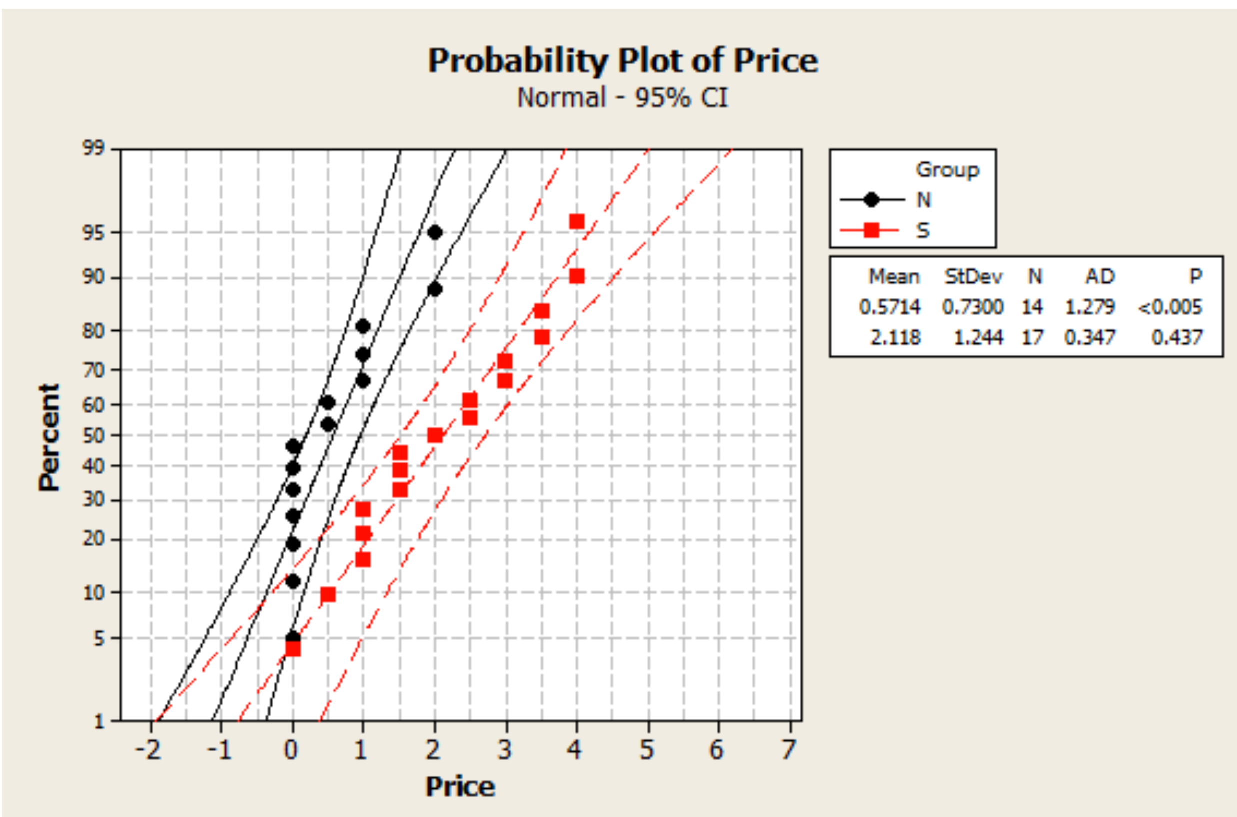
We can conclude that the 90% confidence interval for the mean difference is

(-8.43, -32.46)

**Problem 6.**


Boxplot of Price
Price
4
3
2
1
0
N
S
Group

(a)


Probability Plot of Price
Normal - 95% CI
Percent
99
95
90
80
70
60
50
40
30
20
10
5
1
-2
-1
0
1
2
3
4
5
6
7
Price
Group
N
S
Mean StDev N AD P
0.5714 0.7300 14 1.279 <0.005
2.118 1.244 17 0.347 0.437

From the probability and boxplot we can see there is no outlier in these two groups of data. And they are all right skewed. Use t procedure for this data is appropriate.

(b) **Descriptive Statistics: Price**

```
            Total
Variable  Group  Count   Mean  StDev
Price     N         14  0.571  0.730
          S         17  2.118  1.244
```

(c) H0: $\mu_s=\mu_n$

H$\alpha$: $\mu_s>\mu_n$

(d) **Two-Sample T-Test and CI: Price, Group**

```
Two-sample T for Price

Group   N   Mean  StDev  SE Mean
N      14  0.571  0.730     0.20
S      17   2.12   1.24     0.30


Difference = mu (N) - mu (S)
Estimate for difference:  -1.546
95% upper bound for difference:  -0.933
T-Test of difference = 0 (vs <): T-Value = -4.30  P-Value = 0.000  DF = 26
```

We can conclude that there is strong evidence can prove that people in sad mood would like to go shopping. Because of the P-value is 0.

(e)
```
95% lower bound for difference:  -2.159
```
From these two sets of data we can get the interval is (-0.93, -2.159).