#LAMIN JAMMEH
#EE597
#HW14

#Pr.25.2 (Confidence interval for the mean)

```
restart;
```

```
restart;
Digits := 5;
```

$$Digits := 5 \tag{1}$$

```
sample := [25.5, 24.7, 24.6, 24.8, 26.4, 28.7]:
with(Statistics):
n := Count(sample);
```

$$n := 6 \tag{2}$$

```
xbar := Mean(sample);
```

$$xbar := 25.783 \tag{3}$$

```
s := StandardDeviation(sample);
```

$$s := 1.5817 \tag{4}$$

```
#obtain the 99% point of the t-distribution with n-1
C := Quantile('StudentT'(n - 1), 0.99);
```

$$C := 3.3648 \tag{5}$$

```
k := evalf[4]( C·s / sqrt(n) );
```

$$k := 2.173 \tag{6}$$

```
conf1 := xbar - k;
```

$$conf1 := 23.610 \tag{7}$$

```
conf2 := xbar + k;
```

$$conf2 := 27.956 \tag{8}$$

#Pr.25.4 (Confidence interval for the mean)

```
restart;
Digits := 5;
```

$$Digits := 5 \tag{9}$$

```
sample := [242, 251, 248, 245, 250, 247, 244]:
with(Statistics):
n := Count(sample);
```

$$n := 7 \tag{10}$$

```
xbar := Mean(sample);
```

$$xbar := 246.71 \tag{11}$$

```
s := 3.2514;
```

$$s := 3.2514 \tag{12}$$

```
#obtain the 99% point of the t-distribution with n-1
```

$C := Quantile('StudentT'(n-1),\ 0.99);$

$$C := 3.1426 \tag{13}$$

$k := evalf[4]\left(\frac{C \cdot s}{\mathrm{sqrt}(n)}\right);$

$$k := 3.863 \tag{14}$$

$conf1 := xbar - k;$

$$conf1 := 242.85 \tag{15}$$

$conf2 := xbar + k;$

$$conf2 := 250.57 \tag{16}$$

#Pr.25.6 (Test for the mean)

$restart;$
$with(Statistics):$

$n := 10:\quad mu0 := 24:\ mu1 := 27:\qquad var := 9:\ sd := \mathrm{sqrt}\left(\frac{var}{n}\right):\quad \mathrm{mu} := 25.8:\quad Digits := 5:$

$a := 0.05:$

#test for mu0
$c0 := Quantile('Normal'(mu0, sd), a);$

$$c0 := 22.440 \tag{17}$$

$powerleft := CDF('Normal'(\mathrm{mu}, sd), c0);$

$$powerleft := 0.000198740261967179 \tag{18}$$

#test for mu1
$c1 := Quantile('Normal'(mu1, sd), a);$

$$c1 := 25.440 \tag{19}$$

$powerleft := CDF('Normal'(\mathrm{mu}, sd), c1);$

$$powerleft := 0.352168206744226 \tag{20}$$

#Pr.25.10 (Comparison of means)

$restart;$
$Digits := 5;$

$$Digits := 5 \tag{21}$$

$with(Statistics):$
$Sa1 := [97, 108, 115, 103, 113, 117, 130, 127, 111, 107]:$
$n1 := Count(Sa1);$

$$n1 := 10 \tag{22}$$

$xbar := Mean(Sa1);$

$$xbar := 112.80 \tag{23}$$

$xvar := Variance(Sa1);$

$$xvar := 102.84 \tag{24}$$

$Sa2 := [115, 123, 138, 118, 105, 130, 132, 127]:$
$n2 := Count(Sa2);$

$$n2 := 8 \quad (25)$$

$ybar := Mean(Sa2);$

$$ybar := 123.50 \quad (26)$$

$yvar := Variance(Sa2);$

$$yvar := 111.70 \quad (27)$$

$Quantile('StudentT'(n1 + n2 - 2),\ 0.05);$

$$-1.7459 \quad (28)$$

$Quantile('StudentT'(n1 + n2 - 2),\ 0.95);$

$$1.7459 \quad (29)$$

#If t0 lies between these values (inclusively), accept the hypothesis. Otherwise reject it

$$t0 := evalf\left(\frac{\mathrm{sqrt}\left(\frac{n1 \cdot n2 \cdot (n1 + n2 - 2)}{(n1 + n2)}\right) \cdot (xbar - ybar)}{\mathrm{sqrt}((n1 - 1) \cdot xvar + (n2 - 1) \cdot yvar)}\right);$$

$$t0 := -2.1836 \quad (30)$$

#test is rejected