# **Moussa Academy**

# **Stat101 – Assignment 3 – 2016**

## True or False:

1. True
2. False
3. True
4. True
5. False
6. True

## Multiple Choice Questions:

1. a
2. c
3. c
4. d
5. c
6. a

## Essay Type Questions:

1. H0: P = 0.2

H1: P < 0.2 “Left tailed test”

p̂ = 0.15

α = 0.01

n = 100

q = 1 – p = 1 – 0.2 = 0.8

Z = $\frac{\hat{p}-p}{\sqrt{\frac{pq}{n}}}$ = $\frac{0.15-0.2}{\sqrt{\frac{0.2\*0.8}{100}}}$ = -1.25

Using p-value:

From z distribution table: at α = 0.05

 p-value = 0.1056

 P > α

Fail to reject null hypothesis

There is no sufficient evidence to support the claim that less than 20% of American adults are allergic to the medication.

1. H0: µ = 20

H1: µ > 20 “right-tailed test”

σ is known

n = 49

x̄ = 22.6

σ = 5.5

α = 0.05

Z = $\frac{\bar{x}-µ}{\frac{σ}{\sqrt{n}}}$ = $\frac{22.6-20}{\frac{5.5}{\sqrt{49}}}$ = 3.31

Using P-value:

From z table the probability at z = 3.31 equal: 0.9995

Since this is a right tailed test, and the values in table are cumulative from the lift

p-value = 1 – 0.9995 = 0.0005

and α = 0.05

p < α

Reject Null hypothesis

There is sufficient evidence to support the claim that the typical amount spent per customer is more than $20.00.

1. H0: µ = 500

H1: µ ≠ 500 “Two-tailed test”

n = 36

x̄ = 546

s = 120

α = 0.05

σ is not known

t = $\frac{\bar{x}-µ}{\frac{s}{\sqrt{n}}}$ = $\frac{546-500}{\frac{120}{\sqrt{36}}}$ = 2.3

Critical Region:

Getting critical value from t table at: α = 0.05, Two-tailed, df = n – 1 = 35 – 1 = 36

tα/2 = ±2.03



t falls in Critical Region

Reject null hypothesis

There is sufficient evidence to support the claim that their mean score is different from the mean that is expected from all applicants.

1. n1 = 200 x1 = 120

n2 = 200 x2 = 150

p̂1 = $\frac{x1}{n1}$ = $\frac{120}{200}$ = 0.6

p̂2 = $\frac{x2}{n2}$ = $\frac{150}{200}$ = 0.75

α = 0.05

Pooled sample proportion: p̄ = $\frac{x1+x2}{n1+n2}$ = $\frac{120+150}{200 +200}$ = $\frac{270}{400}$ = 0.675

 q̄ = 1 – p̄ = 1 – 0.675 = 0.325

H0: p1 = p2

H1: p1 < p2 “Left-tailed test”

Z = $\frac{\left(\hat{p}1-\hat{p}2\right)-(p1-p2)}{\sqrt{\frac{\bar{p}\*\bar{q}}{n1}+\frac{\bar{p}\*\bar{q}}{n2}}}$ = $\frac{\left(0.6-0.75\right)-(0)}{\sqrt{\frac{0.675\*0.325}{200}+\frac{0.675\*0.325}{200}}}$ = -3.2

P-value: “left-tailed” , from z table at z = -3.2

P = 0.007

P < α

Reject null hypothesis

There is sufficient evidence to support the claim that college faculty vote at a lower rate

than college students.

1. H0: µ1 = µ2

H1: µ1 ≠ µ2 “Two-tailed test”

α = 0.05

t = $\frac{\left(\bar{x}1-\bar{x}2\right)-(µ1-µ2)}{\sqrt{\frac{s1^{2}}{n1}+\frac{s2^{2}}{n2}}}$ = $\frac{\left(43-41\right)-(0)}{\sqrt{\frac{4.5^{2}}{23}+\frac{5.1^{2}}{13}}}$ = 1.178

Critical Value:

From t table at α = 0.05, df = 13 – 1 = 12, two tailed test

tα/2 = ±2.179

critical region



Test t does not fall in critical region

Fail to reject null hypothesis

There is no sufficient evidence to support the claim that 𝜇1 ≠ 𝜇2.

1. E = tα/2$\sqrt{\frac{s1^{2}}{n1}+\frac{s2^{2}}{n2}}$ = 2.179$\sqrt{\frac{4.5^{2}}{23}+\frac{5.1^{2}}{13}}$ = 3.699

0.95 confidence interval: → α = 0.05, tα/2 = 2.179 “from table”

$\left(\bar{x}1-\bar{x}2\right)-E<(µ1-µ2)$ < $\left(\bar{x}1-\bar{x}2\right)+E$

(43 – 41) – 3.699 < µ1 - µ2 < (43 – 41) + 3.699

2 – 3.699 < µ1 - µ2 < 2 + 3.699

“Confidence Interval”: -1.7 < µ1 - µ2 < 5.7