1. µ = 100

S.D=15

n=36

mean of the sample=108

Null Hypothesis: µ=100

Alternate hypothesis: µ!=100

Zscore =(108-100)/(15/6)

=3.2

Here alpha is taken as .05

Since Zscore>than 1.96 we an reject null hypothesis

2. n1P1 = 100 \* 0.52 = 52, n1(1 - P1) = 100 \* 0.48 = 48, n2P2 = 100 \* 0.47 = 47, and n2(1 - P2) = 100 \* 0.53 = 53 are each greater than 10, the sample size is large enough.

 Mean of the difference in sample proportions: E(p1 - p2) = P1 - P2 = 0.52 - 0.47 = 0.05.

 standard deviation of the difference.

σd = sqrt{ [ P1(1 - P1) / n1 ] + [ P2(1 - P2) / n2 ] }   
 σd = sqrt{ [ (0.52)(0.48) / 100 ] + [ (0.47)(0.53) / 100 ] }   
 σd = sqrt (0.002496 + 0.002491) = sqrt(0.004987) = 0.0706

 To find the probability that p1 is less than p2 is equivalent to finding the probability that p1 - p2 is less than zero

zp1 - p2 = (x - μp1 - p2 ) / σd = = (0 - 0.05)/0.0706 = -0.7082

from the z table we get for a z score of =0.7082 the probability is 0.24.

Therefore, the probability that the survey will show a greater percentage of Republican voters in the second state than in the first state is 0.24.

3) µ=1026

S.D=209

X=1100

Z=X- µ/ S.D

Z=1100-1026/209=0.3541

This means that my score is .3541 standard deviations above the mean.

Task 2:

1)Null Hypothesis=Gender and education level are independent

chi-square =

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 60 | 50.886 | 9.114 | 83.065 | 1.632374 |
| 54 | 49.86 | 4.14 | 17.1396 | 0.343755 |
| 46 | 50.377 | -4.377 | 19.15813 | 0.380295 |
| 41 | 49.87 | -8.87 | 78.6769 | 1.57764 |
| 40 | 49.1139 | -9.1139 | 83.06317 | 1.691236 |
| 44 | 48.132 | -4.132 | 17.07342 | 0.354721 |
| 53 | 48.623 | 4.377 | 19.15813 | 0.394014 |
| 57 | 48.132 | 8.868 | 78.64142 | 1.63387 |
|  |  |  |  | 8.007904 |
|  |  |  |  |  |

From the table for degrees of freedom=(4-1)(2-1)=3 chisquare value for 0.05 is 7.81473.

Chisquare value=8.007 which is greater than the table value(7.8413) so null hypothesis is rejected which means gender and education level are dependent.

2)Group1:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| value | mean | deviation | sq.deviation | |
| 51 | 48.2 | 2.8 | 7.84 |  |
| 45 | 48.2 | -3.2 | 10.24 |  |
| 33 | 48.2 | -15.2 | 231.04 |  |
| 45 | 48.2 | -3.2 | 10.24 |  |
| 67 | 48.2 | 18.8 | 353.44 |  |
|  |  |  | sum=612.8 |  |
|  |  |  |  |  |
| Group2: |  |  |  |  |
| value | mean | deviation | sq.deviation | |
| 23 | 35.4 | -12.4 | 153.76 |  |
| 43 | 35.4 | 7.6 | 57.76 |  |
| 23 | 35.4 | -12.4 | 153.76 |  |
| 43 | 35.4 | 7.6 | 57.76 |  |
| 45 | 35.4 | 9.6 | 92.16 |  |
|  |  |  | Sum=515.2 |  |
| Group3 |  |  |  |  |
|  | mean | deviation | sq.deviation | |
| 56 | 69.8 | -13.8 | 190.44 |  |
| 76 | 69.8 | 6.2 | 38.44 |  |
| 74 | 69.8 | 4.2 | 17.64 |  |
| 87 | 69.8 | 17.2 | 295.84 |  |
| 56 | 69.8 | -13.8 | 190.44 |  |
|  |  |  | Sum=732.8 |  |
|  |  |  |  |  |

Var1=612.8/5-1=153.2

Var2=515.2/5-1=128.8

Var3=732.8/5-1=183.2

MSerror=(153.2+128.8+183.23)/3=155.07

dferror=15−3=12

SSerror=(155.07)(15−3)=1860.8

Grand mean = 48.2+35.4+69.83=51.13

group mean grand mean deviations sq deviations

48.2 51.13 -2.93 8.58

35.4 51.13 -15.73 247.43

69.8 51.13 18.67 348.57

Sum of squares (SSmeans)=8.58+247.43+348.57=604.58

Varmeans=604.583−1=302.29

MSbetween=(302.29)(5)=1511.45

dfgroups=3−1=2dfgroups=3−1=2

SSgroup=(1511.45)(3−1)=3022.9

F=1511.45/155.07=9.75

**Test statistic and critical value**

F=1511.45155.07=9.75F=1511.45155.07=9.75

Fcritical(2,12)=3.89Fcritical(2,12)=3.89

 Decision: reject H0  Decision: reject H0

**ANOVA table**

| **source** | **SS** | **df** | **MS** | **F** |
| --- | --- | --- | --- | --- |
| group | 3022.9 | 2 | 1511.45 | 9.75 |
| error | 1860.8 | 12 | 155.07 |  |
| total | 4883.7 |  |  |  |

**Effect size**

η2=3022.94883.7=0.62η2=3022.94883.7=0.62

**APA writeup**

*F*(2, 12)=9.75, *p* <0.05, η2η2=0.62.

3) **Variance of first set**   
  
Total Inputs (N) =(10,20,30,40,50)   
Mean (xm)= 150/5 =30  
S =sqrt(1/(5-1)((10-30)2+(20-30)2+(30-30)2+(40-30)2+(50-30)2))   
 =sqrt(1/4((-20)2+(-10)2+(0)2+(10)2+(20)2))   
 =sqrt(1/4((400)+(100)+(0)+(100)+(400)))   
 =sqrt(250)   
 =15.8114   
Variance=SD2   
Variance=15.81142   
Variance=250   
  
**Variance of second set**   
For 5, 10,15,20,25:   
Total Inputs(N) =(5,10,15,20,25)

Mean (xm)= 75/5 =15  
S=sqrt(1/(5-1)((5-15)2+(10-15)2+(15-15)2+(20-15)2+(25-15)2))   
=sqrt(1/4((-10)2+(-5)2+(0)2+(5)2+(10)2))   
=sqrt(1/4((100)+(25)+(0)+(25)+(100)))   
=sqrt(62.5)   
=7.9057   
Variance=SD2   
Variance=7.90572   
Variance=62.5   
  
**To calculate F Test**   
F Test = (variance of 10, 20,30,40,50) / (variance of 5, 10, 15, 20, 25)   
= 250/62.5   
= 4.   
  
The F Test value is 4.