Question 1

(1)

The population of interest in this study is the Australian workers. Here, the Australian government is interested in finding the factors that influence the life satisfaction of workers with life and travel time to work. For the purpose of this study, Australian workers are randomly selected and information such as Age, sex, marital status, hours spent in watching TV daily, race, educational qualification (in years), occupation, hours spent on housework, hours spent on job related works per week, status of work last week, income, life satisfaction and time taken to travel to work are recorded

(2)

The variable income is a continuous variable and hence descriptive statistics is computed for this variable and the ethnic is a nominal variable and therefore, frequency distribution is constructed for ethnic variable. The summary statistics and graphs for these two variables are given below

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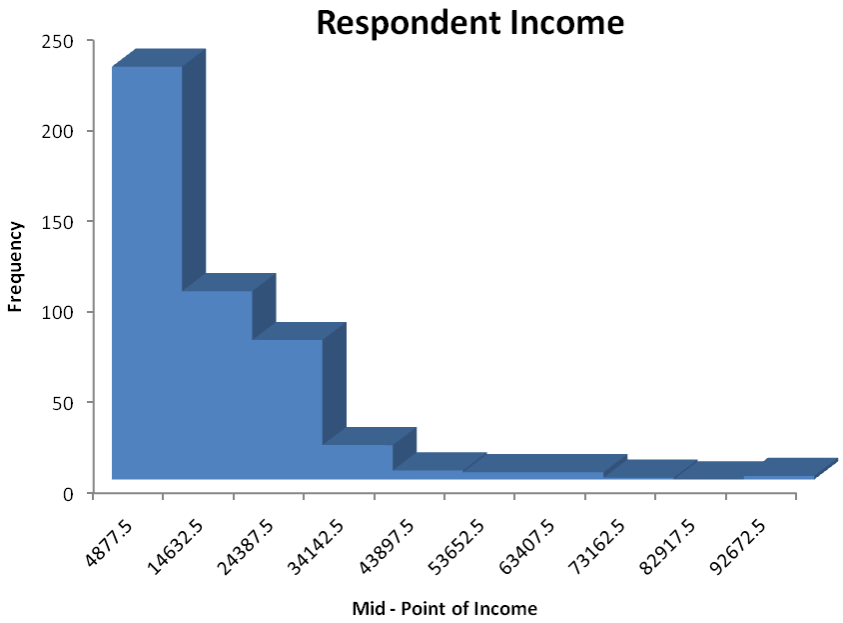
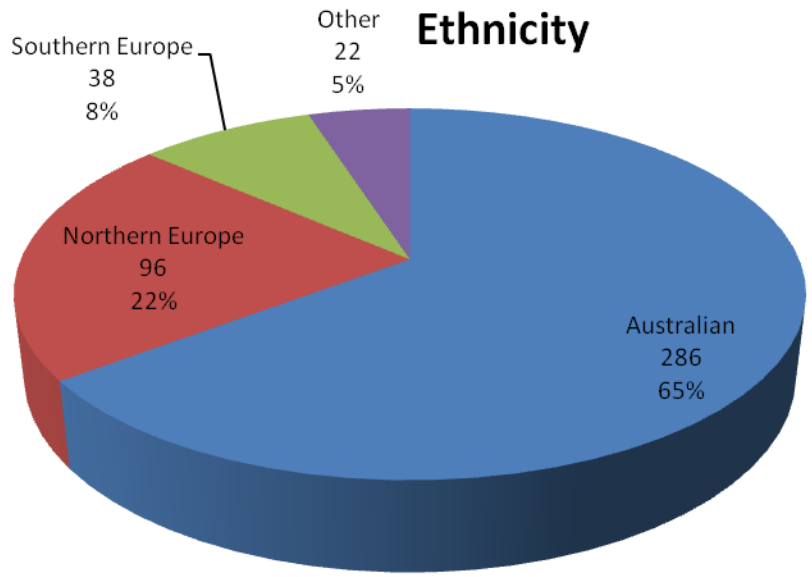
Mean	12760.6
Standard Error	641.5926
Median	8640
Mode	0
Standard Deviation	13503.96
Sample Variance	1.82E+08
Kurtosis	8.138731
Skewness	2.204028
Range	97550
Minimum	0
Maximum	97550
Sum	5652946
Count	443



Frequency Distribution – Ethnicity

Ethnic	Frequency	Percentage
Australian	286	64.71%
Northern Europe	96	21.72%
Southern Europe	38	8.60%
Other	22	4.98%
Total	442	



Report

The mean Australian workers income (n = 443) is 12760.6 AUD with a standard deviation of 13503.96 AUD. The median income of Australian workers is 8640 AUD, indicating that, nearly 50% of sampled Australian workers income fall below 8640 AUD and 50% of sampled Australian workers income fall above 8640 AUD. The minimum and maximum recorded Australian worker income is 0 AUD and 97550 AUD respectively.

Regarding ethnicity, about 64.71% of the workers are Australians, 21.72% were from Northern Europe, 8.60% were from Southern Europe and the remaining 4.98 were from other ethnic background

(3)

In order to determine whether the proportion of Australian workers who are satisfied with life was decreased from 0.65, we perform one proportion z test

Null Hypothesis: H_0: P >= 0.65

That is, the proportion of Australian workers who are satisfied with life was not decreased from 0.65

Alternate Hypothesis: H_a: P < 0.65

That is, the proportion of Australian workers who are satisfied with life was decreased from 0.65

Level of Significance

Let the level of significance be $\alpha = 0.05$

Test Statistic

The z test statistic is

$$Z = \frac{p - P}{\sqrt{\frac{P * (1 - P)}{n}}}$$

The table given below shows the workings of z test statistic

Data	
Null Hypothesis p =	**0.65**
Level of Significance	**0.05**
Number of Items of Interest	**263**
Sample Size	**436**

Intermediate Calculations	
Sample Proportion	0.603211009
Standard Error	0.0228
Z Test Statistic	**-2.0483**

Lower-Tail Test	
Lower Critical Value	**-1.6449**
***p*-Value**	**0.0203**
Reject the null hypothesis	

From the above table, we see that the value of z test statistic is – 2.0483 and its corresponding p – value is 0.0203 < 0.05, indicating that there is sufficient evidence to reject the null hypothesis at 5% level of significance. Therefore, we conclude that the proportion of Australian workers who are satisfied with life was decreased from 0.65

(4)

Here, we wish to determine whether the average years of education Australian workers differ significantly from 10.8 and therefore, we use single mean z test to test the claim

Null Hypothesis: H_0: $\mu = 10.8$

That is, the average years of education Australian workers do not differ significantly from 10.8 years

Alternate Hypothesis: H_a: $\mu \neq 10.8$

That is, the average years of education Australian workers differ significantly from 10.8 years

Level of Significance

Let the level of significance be $\alpha = 0.05$

Decision Rule

- If the p – value of t test statistic is less than 0.05, then there is sufficient evidence to reject the null hypothesis
- If the p – value of t test statistic is greater than 0.05, then there is no sufficient evidence to reject the null hypothesis

Test Statistic

The z test statistic is

$$Z = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

The table given below shows the workings of z test statistic

Data	
Null Hypothesis m=	**10.8**
Level of Significance	**0.05**
Population Standard Deviation	**3.16**
Sample Size	**419**
Sample Mean	**11**
Intermediate Calculations	
Standard Error of the Mean	0.1544
***Z* Test Statistic**	**1.1409**

Two-Tail Test	
Lower Critical Value	**-1.9600**
Upper Critical Value	**1.9600**
***p*-Value**	**0.2539**
Do not reject the null hypothesis	

From the above table, we see that the value of z test statistic is 1.1409 and its corresponding p – value is 0.2539 > 0.05, indicating that there is no sufficient evidence to reject the null hypothesis at 5% level of significance. Therefore, we conclude that the average years of education Australian workers do not differ significantly from 10.8 years

Question 2

(1)

The two suburbs taken into consideration are

- Suburb1 (New Town, SA 5554)
- Suburb 2 (HURSTVILLE, NSW 2220)

Convenience sampling technique was used to generate the random sample of 50 price information of properties from each suburbs. A convenience sample is a kind of non – probability sampling technique, which is easy to use and the researcher has the full freedom and convenient accessibility to select the subjects or respondents for his study.

(2)

The population of interest in this study is the property price or selling price of homes in Sydney.

(3)

In order to determine whether the mean price of two-bedroom apartment differs significantly in two suburbs in Sydney, we perform independent sample t test. The null and alternate hypotheses are given below

Null Hypothesis: H_0: $\mu_1 = \mu_2$

That is, the mean price of two-bedroom apartment do not differ significantly in two suburbs in Sydney

Alternate Hypothesis: H_0: $\mu_1 \neq \mu_2$

That is, the mean price of two-bedroom apartment differ significantly in two suburbs in Sydney

Level of Significance

Let the level of significance be $\alpha = 0.05$

Decision Rule

- If the p – value of t test statistic is less than 0.05, then there is sufficient evidence to reject the null hypothesis
- If the p – value of t test statistic is greater than 0.05, then there is no sufficient evidence to reject the null hypothesis

Test Statistic

The t test statistic is

$$t = \frac{\overline{x_1} - \overline{x_2}}{s * \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

The table given below shows the workings of independent sample t test statistic

t-Test: Two-Sample Assuming Equal Variances

	Suburb1 (New Town, SA 5554)	*Suburb 2 (Hurstville, NSW 2220)*
Mean	289651.9	1099296
Variance	22750776664	357329564473.47
Observations	50	50
Pooled Variance	190040170568.50	
Hypothesized Mean Difference	0	
df	98	
t Stat	-9.28627315	
P(T<=t) one-tail	2.14332E-15	
t Critical one-tail	1.660551217	
P(T<=t) two-tail	4.28663E-15	
t Critical two-tail	1.984467455	

Going through the above table, we see that the value of t test statistic is -9.29 and its corresponding p – value is 0.000 < 0.001. Since the p – value of t test statistic is very low, there is sufficient statistical evidence to reject the null hypothesis at 5% level of significance. Therefore, we conclude that the mean price of two-bedroom apartment differ significantly in two suburbs in Sydney. In addition, the mean price of two bedroom apartment in suburb 1 is $ 289,651.9 and the mean price of two bedroom apartment in suburb 2 is $ 1,099,296. On

comparing the mean prices, we can say that the mean price of two bedroom apartment in suburb 2 (HURSTVILLE, NSW 2220) is significant high when compared with the mean price of two bedroom apartment in Suburb1 (New Town, SA 5554). Therefore, the study findings suggests that the two bedroom apartment in Hurstville, NSW is five times costlier when compared to that of the price of two bedroom apartment in New Town, SA