Assignment 2

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Question 1

The chart of monthly prices over 10 years for security COH

The graph shown above is made from the Australian Stock Echange website. This graph shows values in the beginning of every quarter for every year 2006 to 2015 preferably for the months January, April, July and October. The values in the table are listed below:

a)

0	40000
2006	45000
2007	50000
2008	55000
2009	60000
2010	65000
2011	70000
2012	75000
2013	80000
2014	85000
2015	90000

Interpretation

The stem and leaf display the data and reveals that the latter figure lumps only one value into a single row. This demonstrates that stem items in a display depends on the exact form of the provided data. The data compares the ASX information from the year 2006 to 2015. According to the results, the data displayed the stems and leaves and portray two entire digits (one for the leaf and the other for stem). It is examined that data does not provide any negative value. The data below gives the potential patterns in the responses that cannot be shown in the original listing of data.

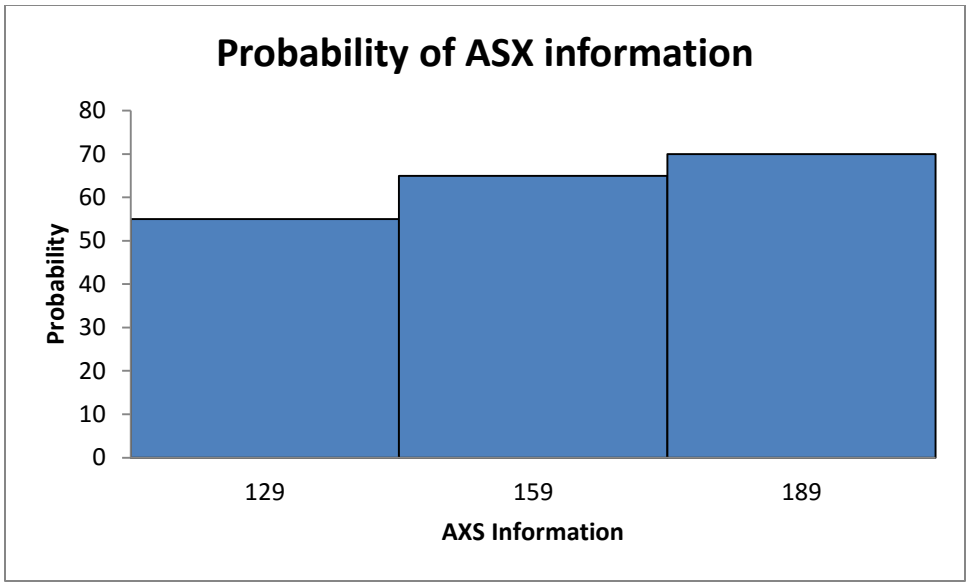
Stem	**Leaf**	
4	0	5
5	0	5
6	0	5
7	0	5
8	0	5
9	0	

b) Relative Frequency

Class interval	Lower Bound	Upper Bound	Midpoint	Frequency	Relative frequency
100-130	100	129	114.5	55	0.289473684
130-160	130	159	144.5	65	0.342105263
160-190	160	189	174.5	70	0.368421053
				190	

Formulas usage in excel

Class interval	Lower Bound	Upper Bound	Midpoint	Frequency	Relative frequency
100-130	100	129	=AVERAGE(B23:C23)	55	=E23/$E$26
130-160	130	159	=AVERAGE(B24:C24)	65	=E24/$E$26
160-190	160	189	=AVERAGE(B25:C25)	70	=E25/$E$26
				=SUM(E23:E25)	



Graph 1: Relative frequency histogram

Interpretation

The histogram above shows the shape of the statistical data complied with the class intervals in which the data fall into groups. This demonstrates that the data consist of equal number in each group. The above graph shows above is known as histogram of relative frequency which has been constructed by applying the class intervals and examining the lower bound, upper bound and midpoint. The shape of the histogram is right skewed. The graph also demonstrates that AXS information is increasing time by time.

c) The histogram above demonstrates the shape of right skewed with the class intervals from 100 to 200. The stem and leaf display shows the figure lumps one value into a single row. According to the stem and leaf display, it is identified that the original values still be determined and tells that bottom leaf has only one value which is 90. On the other hand, if class intervals are doubled which means the first class would be from 100 to less than 300, this will increase the class intervals where the data will be extracted according to the new class intervals. The probability of each interval will be increased by 1% or more.

d) The chart of monthly prices over ten years for security COH demonstrates the proportions from 40000 to 90000. According to the graph from the Australian Stock Exchange website, it is examined that stock prices are not proportional to anything; it exactly means the change in the bid. There are seven proportions in total which are above $50. In accordance of the graph above, it can be said that the COH volume increases in the mid of 2011 and 2012.

Question 2

(a) and (b)

	ACT	NSW	NT	QLD	VIC	WA	TAS	SA
First quartile	115	109	128	107.9	109.4	111.5	114.8	109.3
Third quartile	143	140.975	154.8	141.525	138.5	141.25	147.575	137.2
Mean	129.6727	125.6818182	139.9333	123.2727	124.5	125.5444444	131.2818	123.6909
Median	131.4	125.9	142.5	127.7	126.3	127	130.3	124.5
Minimum	96.6	96.6	107.3	86.6	94.2	93.2	104.5	97.5
Maximum	155.3	151.8	157.6	153.8	148.9	151.3	156.7	148.9
Range	58.7	55.2	50.3	67.2	54.7	58.1	52.2	51.4
Coefficient of variation	0.136715	0.14138358	0.133321	0.165758	0.13742406	0.147083497	0.132923	0.12969

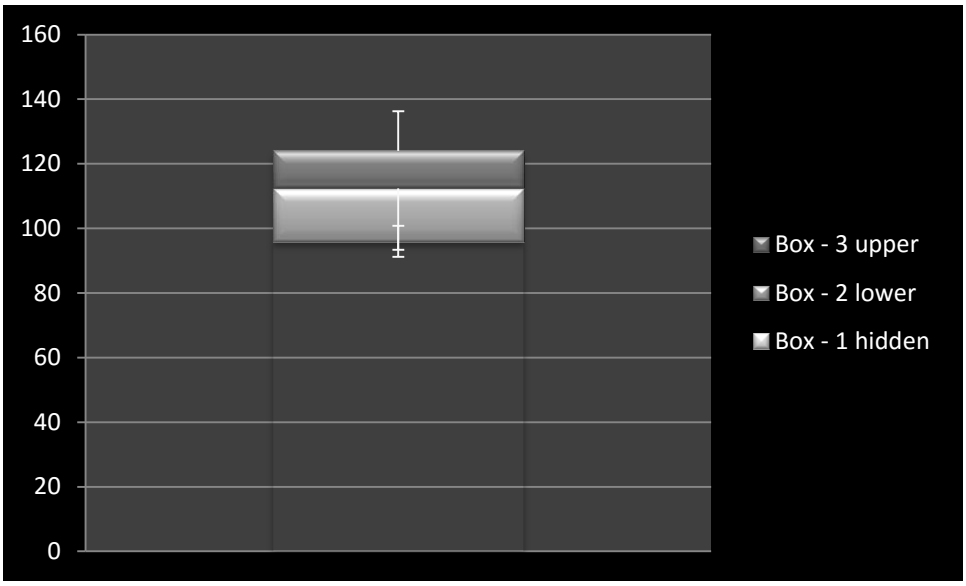
Formulas usage in excel

Box - 1 hidden	=B60	=C60	=D60	=E60	=F60	=G60
Box - 2 lower	=B62-B61	=C62-C61	=D62-D61	=E62-E61	=F62-F61	=G62-G61
Box - 3 upper	=B63-B62	=C63-C62	=D63-D62	=E63-E62	=F63-F62	=G63-G62
Whisker top	=B64-B63	=C64-C63	=D64-D63	=E64-E63	=F64-F63	=G64-G63
Whisker bottom	=B61-B60	=C61-C60	=D61-D60	=E61-E60	=F61-F60	=G61-G60

(c) Box and whisker plot for petrol prices

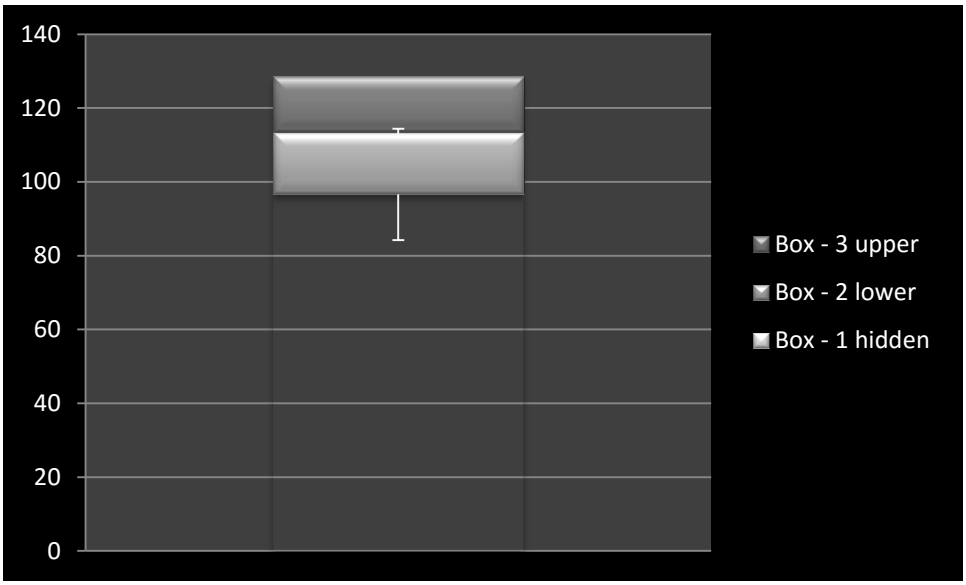
The box and whisker plot is known as an explanatory graphic employed to demonstrate the distribution of dataset (Spitzer, Wildenhain, Rappsilber and Tyers, 2014). According to the graphs, the upper part of the box plot shows maximum and upper quartile while the mid part of it demonstrates the values of median in the data. The lower part shows the lower quartile and minimum. It is identified that box part of a box and whisker plot shows the Inter quartile range (IQR) and the central 50% of the data.

ACT



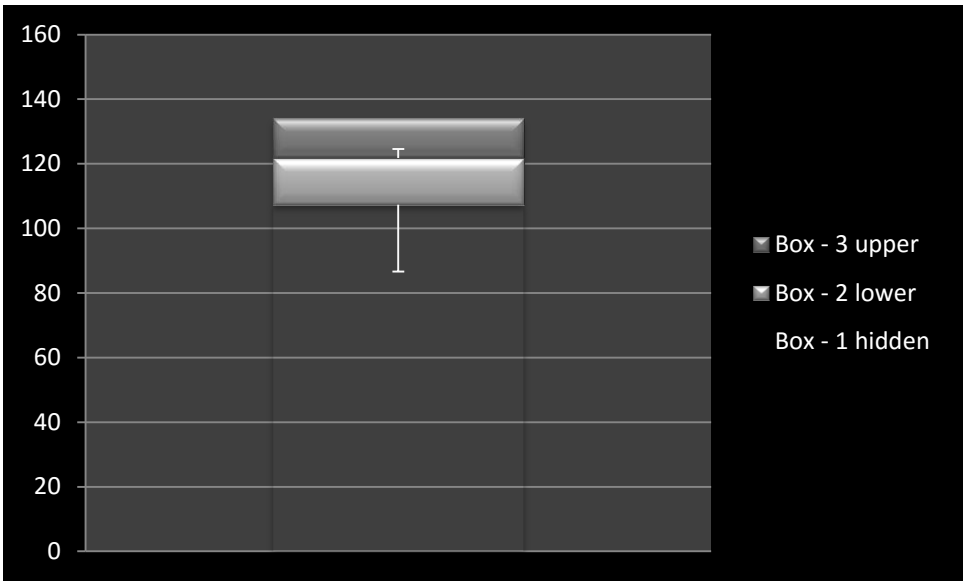
The box plot shows the values of ACT state which demonstrates that the data is symmetric. This means the median value is exactly in the middle.

NSW



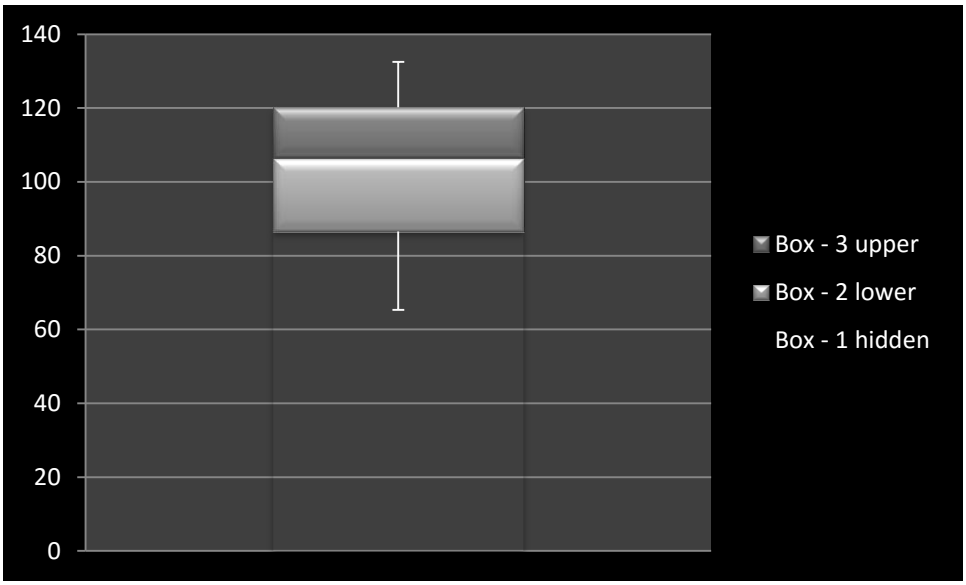
The box plot shows the values of NSW state which demonstrates that the data is positively skewed. This means the median value is very near to quartile 1.

NT



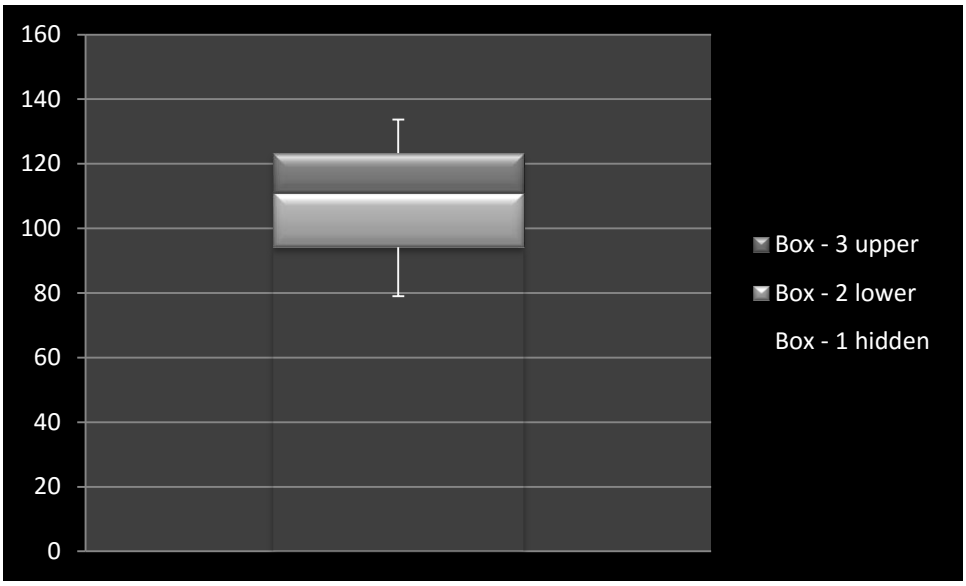
The box plot shows the values of NT state which demonstrates that the data is positively skewed. This means that median value is very near to quartile 1.

QLD



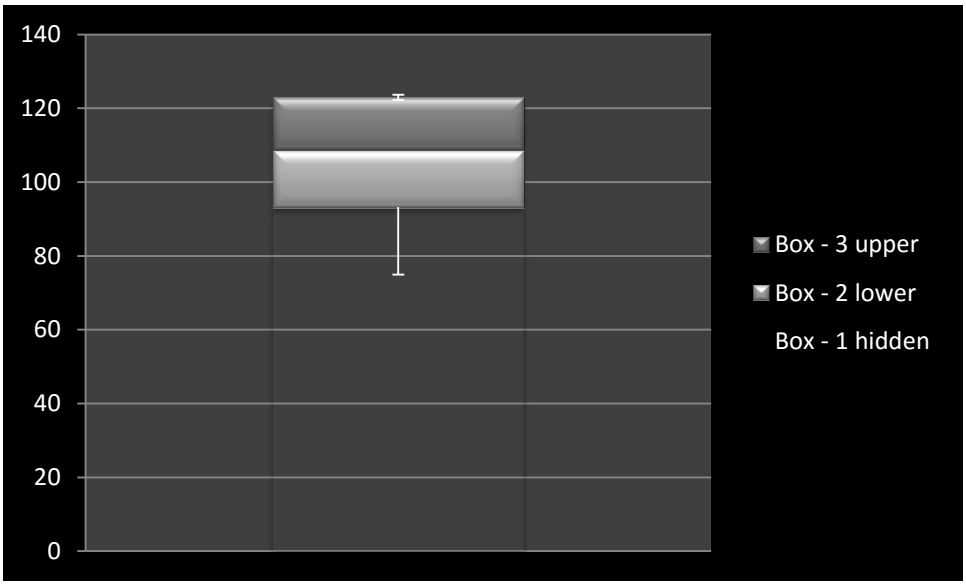
The box plot shows the values of QLD state which demonstrates that the data is negatively skewed. This means the median value is very near to quartile 3 or skewed to the left tail of the distribution.

VIC



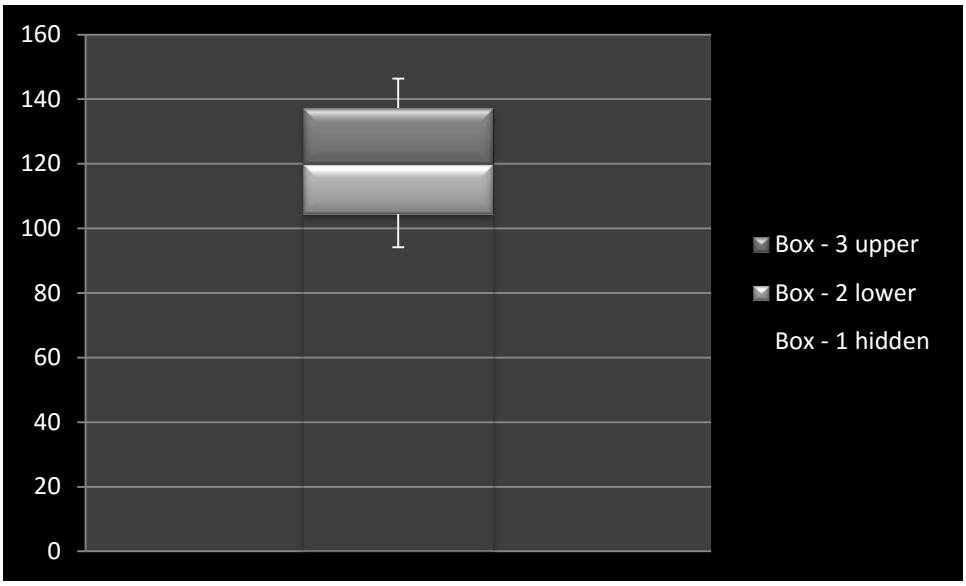
The box plot shows the values of VIC state which demonstrates that the data is negatively skewed. This means that median value is very near to quartile 3 or skewed to the left tail of the distribution.

WA



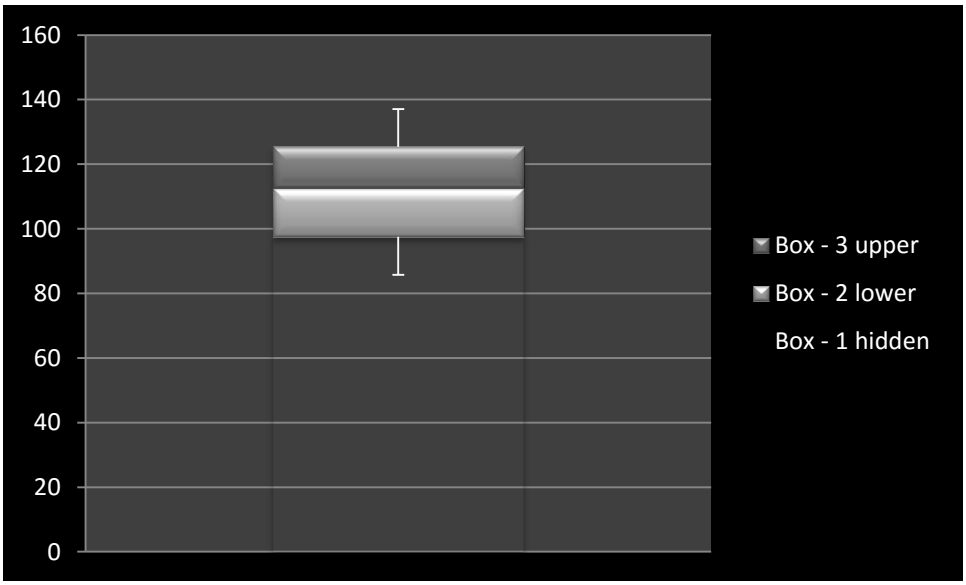
The box plot shows the values of WA state which demonstrates that the data is positively skewed. This means that median value is very near to quartile 1.

TAS



The box plot shows the values of TAS state which demonstrates that the data is positively skewed. This means that median value is very near to quartile 1.

SA



The box plot shows the values of SA state which demonstrates that the data is positively skewed. This means that median value is very near to quartile 1.

Question 3

(a) The probability of a person that has anxiety related problems and belongs to the age group 15 to 24.

124.4/8=15.5.

According to Roza, Hofstra, van der Ende and Verhulst (2014), anxiety is a vague, unpleasant feeling of fear, apprehension, characterized by tension or discomfort derived from the prediction of danger, something unknown or strange. Only anxiety seems to predict the strategies of coping used by children and adolescents. According to Reaven, Blakeley-Smith, Culhane-Shelburne and Hepburn (2012), the individual's state of anxiety can predict the type of strategies used before certain situation. Hence, this section confirms that anxiety symptoms appear concurrently with depressive disorders in childhood. In children and adolescents, the most common anxiety disorders are separation anxiety disorder, with prevalence around 4%, 13 the excessive anxiety disorder or the current TAG (2.7% to 4.6%) 10.11 and specific phobias (2.4% to 3.3%). 10,11 The prevalence of social phobia is around 1% 10 and panic disorder (PD) 0.6%.

(b) The probability that a person, randomly selected, belongs to the age group of 45 or over is known as the experimental probability.

Data: 35.9+422.6+142.9+14.8+36.3+16.5+532.9

Less than 4

Here, total number of heads = 35.9+422.6+142.9+14.8+36.3+16.5+532.9 = 1201.9

The probability of getting random person from the age group 45 or over is less than 4

Thus, P (less than 4) = 35.9+422.6+142.9+14.8/1201.9 = 0.512

Equals to 5

There are 16.5 cases in which there are 5 persons

Thus, P (persons equal to 5) =16.5/1201.9 = 0.013

In accordance of Christophersen and Vanscoyoc (2013), anxiety symptoms are common in other psychiatric disorders. It is an anxiety that explains the symptoms of primary disorder (examples: the anxiety of early schizophrenic outbreak; the fear of separation from parents in a person with major depression) and is not a set of symptoms that determines a typical anxiety disorder.

(c) Given that the person belongs to the age group of 25 to 34, what is the probability that he or she is suffering from alcohol and drug problems?

Alcohol and drug problems: 22.7/8=2.8375

The World Health Organization recommends that the maximum alcohol intake for men is two doses a day and women a dose. A dose corresponding to 1 can of beer 350ml, 140ml 1 glass of wine and 40 ml of distillate. However, substances such as cocaine, crack (a variation of cocaine), marijuana, ecstasy, heroin and many others, always represent danger. The use of amphetamines (very prescribed in weight loss programs) is risky and may cause profound changes in the behavior, and dependence. We also have to mention the situation in which subjects consume alcohol or other drugs and do not become dependent, but may be other types of damage equal to or greater magnitude.

For example, in the study of Tarter, Kirisci, Mezzich, Cornelius, Pajer, Vanyukov and Clark (2014), heavy and prolonged consumption of alcohol increases the chance of cancer arising in various body organs, especially the digestive tract, as well as cirrhosis, hepatitis and pancreatitis; injecting drug use such as cocaine and opioids, can cause infectious and inflammatory diseases, local or widespread, and is closely associated with infection by HIV and hepatitis, due to needle sharing; acute cocaine intoxication can cause acute myocardial infarction and stroke; marijuana, after prolonged use can lead to "motivational syndrome," in which the person finds it very difficult to perform tasks and to make plans to become "apathetic". Therefore, it is worth bearing in mind that alcohol and other drugs, legal or illegal, are potential risk to good health.

(d) Are different types of mental and behavioural problems independent of the gender?

Yes, there are different kinds of mental and behavioural issues related to children or adolescent which are also independent of the gender. Some of the problems can be classified as mental disability or mental retardation or mental disorder, the main feature is the reduction of intellectual ability (IQ). According to Australian Psychiatric Association (2013), the mental disability carrier most often presents difficulties or clear delay in their psychomotor development, acquisition of speech and other skills (adaptive behaviour). Generally it can be associated with a syndrome or cerebral palsy.

It can be said that mental and behavioural disorders clinically provide significant conditions. It is characterized by alterations in thinking and mood depends on behaviours associated with personal distress and /or impairment of functioning. Mental and behavioural disorders are not just variations within the "normal" range, but are clearly abnormal phenomena. It can be said that the common disorders that usually cause severe disability, include depressive disorders, substance use disorders, schizophrenia, epilepsy, Alzheimer’s disease, mental retardation and disorder of childhood and adolescence are influenced by socioeconomic and cultural conditions of the population.

Question 4

(i) What is the probability that on any given week in a year there would be no rainfall?

By using Poison distribution, there are 131 rainy days in 52 weeks which means summation for the year 2014. Thus,

in 1 week, the rain year = 131/364

ywk=yyear/52

Moreover, P(X=0) = (Y^Xxe^(-y)/y)! = ([(yyear/52)]^0e^(-(yyear/52)))/0!= 0.993

(ii) What is the amount of rainfall if only 4% of the weeks have that amount of rainfall or higher?

A week is assumed to start from Monday, there are 52 weeks in a year. Similarly, P(X≥4)= 1-P(X<4) = 1-(P(0)-P(1)) + (P(0)-P(2)) + (P(0)-P(3))+ (P(0)-P(4))

P (X=1) = (y^Xxe^(-y))/y! = ([(yyear/52)]^1 e^(-yyear/52)))/1!+ ([(yyear/52)]^2 e^(-yyear/52)))/2 + ([(yyear/52)]^3 e^(-yyear/52)))/3 + ([(yyear/52)]^4 e^(-yyear/52)))/4

= 0.0085

(b) Assuming that the weekly total amount of rainfall from the data provided in part (a) has a normal distribution, compute the mean and standard deviation of weekly totals.

There are 365 days, the summation for the year 2014 when it rains is 32.62206 mm. Thus, to calculate a day rain must be 32.62206/325= 0.10

Mean = 0.10

By applying the poison distribution with mean 0.10,

P (No rain) = P (X=0) = e^-(32.62206/365) (32.62206/365)^0/0! = 0.914

In order to use binomial distribution with 3 trials x>=4 successes and a probability of 1-0.914,

The answer obtained can be P(X>=4) = 0.00459.

It is examined that the count of days is binomially distributed such as R~Bin (3, 1-p). The probability that there will be no rain on any given week is known as p. According to the poison distribution, it can be said that weekly rainfall amounts are normally distributed where the sum of independent random variables are also normally distributed variables whose mean is known as the sum of means and the sum of variances is known as variance. The probability above is calculated from the mean and variance of the rainfall amount yearly.

Question 5

Normality tests are used to verify that the probability distribution associated with a data set can be approximated by the normal distribution (Kim, 2013).

Year	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Au
1985	1,067	683	502	268	243	78	67	33	2
1986	1,029	668	481	288	228	91	71	32	2
1987	959	705	442	256	213	77	84	36	2
1988	1,037	701	539	223	230	75	51	31	2
1989	959	776	428	222	242	80	61	32	2
1990	797	548	399	226	196	71	68	26	2
1991	663	503	395	184	207	77	67	17	2
1992	649	396	416	165	200	74	54	20	1
1993	581	435	396	218	209	58	44	12	1
1994	646	377	418	159	211	59	41	17	1
1995	620	418	456	181	209	57	61	15	2
1996	581	417	385	181	247	64	72	23	1
1997	576	377	360	148	197	32	60	17	1
1998	556	390	279	168	223	48	69	22	1
1999	577	383	314	151	218	53	49	19	1
2000	603	407	317	166	212	43	51	18	1
2001	524	444	324	153	165	61	50	16	1
2002	561	397	322	154	179	37	55	10	1
2003	539	330	310	157	180	41	53	11	1
2004	510	343	311	139	178	58	35	9	1
2005	508	346	330	148	163	51	55	26	1
2006	496	337	335	117	200	55	45	13	1
2007	435	332	360	124	235	45	58	14	1
2008	374	303	328	99	205	39	75	14	1
2009	454	290	331	119	191	63	31	12	1
2010	405	288	249	118	193	31	50	19	1
2011	364	287	269	103	179	24	45	6	1
2012	369	282	280	94	183	31	49	12	1
2013	333	243	271	98	162	36	37	7	1
2014	312	249	223	107	181	35	39	10	1
ma	18,084	12,655	10,770	4,934	6,079	1,644	1,647	549	
st (Test for rmality)	0.431015	0.432496157	0.43336	0.440232	0.43784115	0.465750515	0.465681	0.542507	0.4

(b) Through the construction of 95% confidence intervals, test if the mean annual rate of road fatality in South Australia is significantly different from that of Western Australia.

According to the results from excel, it is identified that NSW state consist of p value 0.431015 which is greater than 0.05, this shows that we accept our null hypothesis.

For the state VIC, the p value 0.432 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the state QLD, the p value 0.433 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the state SA, the p value 0.440 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the state WA, the p value 0.437 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the state TAS, the p value 0.465 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the state NT, the p value 0.4656 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the state ACT, the p value 0.542 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

For the whole Australia, the p value 0.4286 demonstrates that the null hypothesis can be accepted as p value is greater than 0.05.

According to the results, the mean of South Australia is 164.4667 and Western Australia is 202.633333. In order to test if the mean annual rate of road fatality in South Australia is significantly different from that of Western Australia, we see the hypothesis testing above of both South Australia and Western Australia. It is concluded that the p value of South Australia 0.440 is significantly different from that of Western Australia 0.437. There is a little difference between both countries, hence, it can be said that South Australia has more annual rate of road fatality rather than that of Western Australia.

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