

Question:1

- a) Data has been taken from investing.com. we use ten years of quarterly data of both Westpac banking corporation and national Australia bank.

observation NO:	period	WBK Opening price
1	januray-2012	19.86
2	Apr-12	21.94
3	Jul-12	21.27
4	Oct-12	24.71
5	januray-2013	25.86
6	Apr-13	30.55
7	Jul-13	28.51
8	Oct-13	32.67
9	januray-2014	32.16
10	Apr-14	34.32
11	Jul-14	33.65
12	Oct-14	31.42
13	januray-2015	32.94
14	Apr-15	38.85
15	Jul-15	32.04
16	Oct-15	29.79
17	januray-2016	33.56
18	Apr-16	29.85
19	Jul-16	29.41
20	Oct-16	29.78
21	January-2017	32.6
22	Apr-17	35
23	Jul-17	30.56
24	Oct-17	32.13
25	januray-2018	31.35
26	Apr-18	28.62
27	Jul-18	29.3
28	Oct-18	27.6
29	januray-2019	25.04
30	Apr-19	26.18
31	Jul-19	28.46
32	Oct-19	29.62
33	januray-2020	24.23
34	Apr-20	17.08
35	Jul-20	18.17
36	Oct-20	16.9
37	januray-2021	19.37
38	Apr-21	24.42
39	Jul-21	25.94

40	Oct-21	25.61
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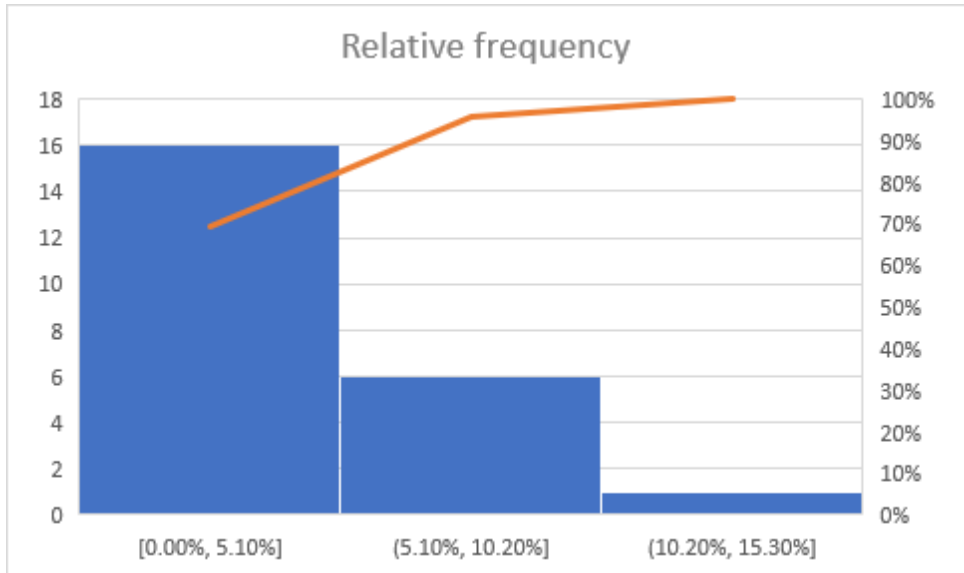
observation NO:	period	NAB Opening price
1	januray-2012	22.22
2	Apr-12	23.54
3	Jul-12	22.55
4	Oct-12	24.26
5	januray-2013	23.78
6	Apr-13	29.34
7	Jul-13	27.95
8	Oct-13	32.72
9	januray-2014	33.13
10	Apr-14	33.72
11	Jul-14	31.21
12	Oct-14	30.57
13	januray-2015	31.96
14	Apr-15	36.55
15	Jul-15	32.28
16	Oct-15	28.98
17	januray-2016	29.14
18	Apr-16	25.9
19	Jul-16	25.63
20	Oct-16	28
21	januray-2017	30.67
22	Apr-17	33.17
23	Jul-17	29.61
24	Oct-17	31.54
25	januray-2018	29.57
26	Apr-18	29.57
27	Jul-18	27.49
28	Oct-18	27.71
29	januray-2019	24.07
30	Apr-19	25.4
31	Jul-19	26.9
32	Oct-19	29.59
33	januray-2020	24.63
34	Apr-20	17.17
35	Jul-20	18.34
36	Oct-20	17.8
37	januray-2021	22.6
38	Apr-21	25.97
39	Jul-21	26.35

40	Oct-21	27.38	
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Stem and leaf plot of WBK and NAB.

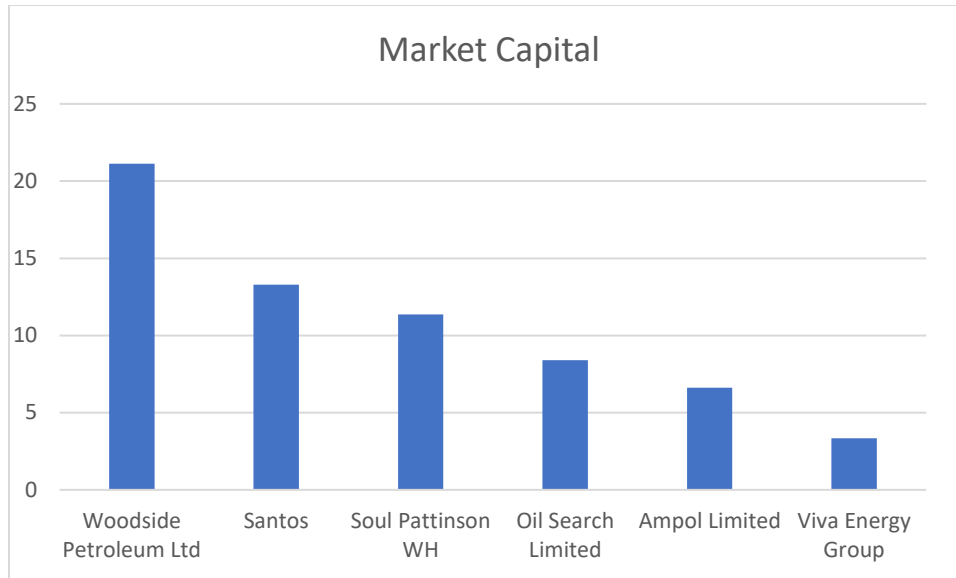
															NAB			WBC																										
															Leaves		stem	leaves																										
9	9	9	8	8	8	7	7	7	6	6	6	6	5	5	4	4	4	4	3	3	8	8	7	1	7	7	8	9																
																									3	0	0	0	0	1	1	1	1	2	2	2	3	3	3	4	4	4	5	9

b)



c) below is the 6 companies from the energy sector listed on ASX with a market capitalization of at least AUS 100 million in market capitalization.

(In billions)		
No:	Company	Market Capital
1	Woodside Petroleum Ltd	21.12
2	Santos	13.29
3	Soul Pattinson WH	11.36
4	Oil Search Limited	8.39
5	Ampol Limited	6.62
6	Viva Energy Group	3.33



d) the PE ratio of NAB is 15.41 means for every dollar of earning investors have to pay 15.41 dollars. The 5 monthly beta of NAB is 0.93, which means that low market risk is as compared to the market index. But the total debt of the bank is much greater than the equity such as total debt in 2021 is 169,840,000 and the total common equity is 62,779,000, which shows a higher risk to the equity investors. On the other hand, a beta of WBK is 0.84 which is lower than the beta of NAB, the PE ratio of WBK is 15.15 which is also lower than the PE ratio of NAB. The total debt of WBK is 90,573,000, and the common equity is 72,035,000, so the debt-to-equity ratio of WBK is much lower than the debt-to-equity ratio of NAB. So, we will recommend buying the stock of WBK and selling the stock of NAB.

Question:2

- a) The mean of every retail industry group turnover is calculated by using the average function in excel.

Retail turnover in Australia by industry group between Oct 2020 and Sep 2021					
Turnover					
(in millions)		Clothing, footwear and personal			Cafes, restaurants and takeaway food
	Household goods	accessory	Department stores	Other retailing	services
Month					
Oct-20	5363.40	2095.60	1571.50	4357.10	3468.90
Nov-20	5981.30	2631.70	1877.00	4697.90	3697.70
Dec-20	5513.30	2395.30	1655.40	4503.30	3819.20
Jan-21	5509.20	2344.80	1638.80	4555.00	3806.80
Feb-21	5550.10	2383.20	1675.40	4536.10	3848.00
Mar-21	5546.10	2511.80	1817.10	4598.90	4034.20
Apr-21	5629.00	2540.90	1695.30	4678.00	4125.30
May-21	5569.00	2540.10	1683.90	4708.60	4155.10
Jun-21	5494.80	2299.30	1565.30	4632.60	3904.40
Jul-21	5371.60	1944.40	1387.00	4658.70	3425.70
Aug-21	5247.00	1640.10	1245.20	4695.90	3186.20
Sep-21	5474.70	1736.20	1241.20	4793.90	3345.90
Mean	=AVERAGE(C8:C19)	2255.28	1587.76	4618.00	3734.78
Standard Deviation	179.0335594	328.377695	202.361061	116.5167019	315.1472465
Minimum	5247.00	1640.10	1241.20	4357.10	3186.20
Quartile 1	5448.925	2057.8	1520.725	4550.275	3458.1
Median	5511.25	2364.00	1647.10	4645.65	3813.00
Quartile 2	5554.825	2518.875	1686.75	4696.4	3936.85
Maximum	5981.30	2631.70	1877.00	4793.90	4155.10

standard deviation of every retail industry group turnover is calculated by using the STDEV.S function in excel.

Retail turnover in Australia by industry group between Oct 2020 and Sep 2021					
Turnover					
(in millions)		Clothing, footwear and personal			Cafes, restaurants and takeaway food
	Household goods	accessory	Department stores	Other retailing	services
Month					
Oct-20	5363.40	2095.60	1571.50	4357.10	3468.90
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Aug-21	5247.00	1640.10	1245.20	4695.90	3186.20
Sep-21	5474.70	1736.20	1241.20	4793.90	3345.90
Mean	5520.79	2255.28	1587.76	4618.00	3734.78
Standard Deviation	=STDEV.S(C8:C19)	328.377695	202.361061	116.5167019	315.1472465

- b) The minimum value has been calculated by using the “MIN” function in excel, the first quartile by using the “QUARTILE.INC” function, median by using “median” function, quartile 3 by using the same function which is used for quartile 1 but the difference is that used to put 3 instead of 1. The maximum value has been calculated by using the MAX function in excel.

Retail turnover in Australia by industry group between Oct 2020 and Sep 2021

Turnover

(in millions)		Clothing, footwear and personal accessory	Department stores	Other retailing	Cafes, restaurants and takeaway food services
Month	Household goods	and personal accessory	stores	Other retailing	takeaway food services
Oct-20	5363.40	2095.60	1571.50	4357.10	3468.90
Nov-20	5981.30	2631.70	1877.00	4697.90	3697.70
Dec-20	5513.30	2395.30	1655.40	4503.30	3819.20
Jan-21	5509.20	2344.80	1638.80	4555.00	3806.80
Feb-21	5550.10	2383.20	1675.40	4536.10	3848.00
Mar-21	5546.10	2511.80	1817.10	4598.90	4034.20
Apr-21	5629.00	2540.90	1695.30	4678.00	4125.30
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Aug-21	5247.00	1640.10	1245.20	4695.90	3186.20
Sep-21	5474.70	1736.20	1241.20	4793.90	3345.90
Mean	5520.79	2255.28	1587.76	4618.00	3734.78
Standard Deviation	179.0335594	328.377695	202.361061	116.5167019	315.1472465
Minimum	=MIN(C8:C19)	1640.10	1241.20	4357.10	3186.20

Retail turnover in Australia by industry group between Oct 2020 and Sep 2021

Turnover

(in millions)		Clothing, footwear and personal accessory	Department stores	Other retailing	Cafes, restaurants and takeaway food services
Month	Household goods	and personal accessory	stores	Other retailing	takeaway food services
Oct-20	5363.40	2095.60	1571.50	4357.10	3468.90
Nov-20	5981.30	2631.70	1877.00	4697.90	3697.70
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Mean	5520.79	2255.28	1587.76	4618.00	3734.78
Standard Deviation	179.0335594	328.377695	202.361061	116.5167019	315.1472465
Minimum	5247.00	1640.10	1241.20	4357.10	3186.20
Quartile 1	=QUARTILE.INC(C8:C19,1)	2057.8	1520.725	4550.275	3458.1

Retail turnover in Australia by industry group between Oct 2020 and Sep 2021

Turnover					
(in millions)		Clothing, footwear and personal accessory	Department stores	Other retailing	Cafes, restaurants and takeaway food services
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Standard Deviation	179.0335594	328.377695	202.361061	116.5167019	315.1472465
Minimum	5247.00	1640.10	1241.20	4357.10	3186.20
Quartile 1	5448.925	2057.8	1520.725	4550.275	3458.1
Median	=MEDIAN(C8:C19)	2364.00	1647.10	4645.65	3813.00

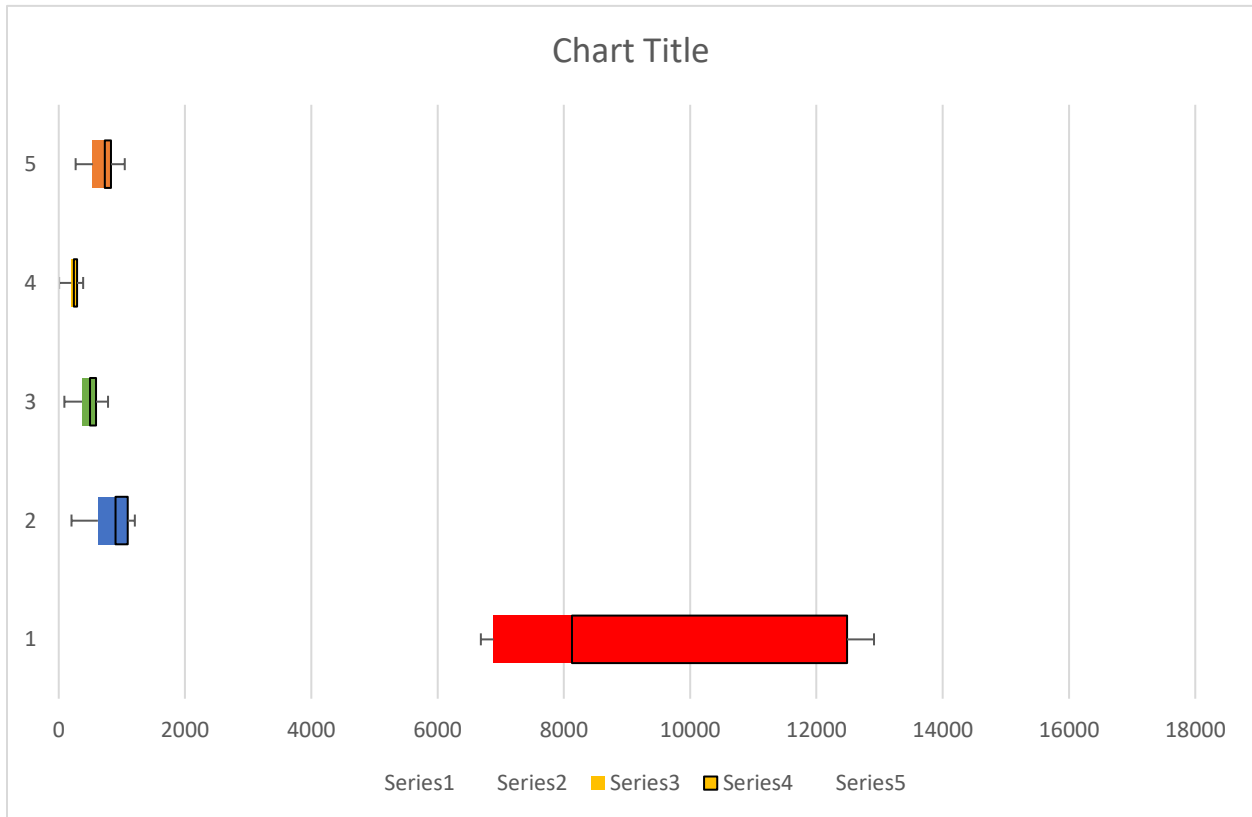
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Minimum	5247.00	1640.10	1241.20	4357.10	3186.20
Quartile 1	5448.925	2057.8	1520.725	4550.275	3458.1
Median	5511.25	2364.00	1647.10	4645.65	3813.00
Quartile 2	=QUARTILE.INC(C8:C19,3)	2518.875	1686.75	4696.4	3936.85

Retail turnover in Australia by industry group between Oct 2020 and Sep 2021

Turnover					
(in millions)	Household goods	Clothing, footwear and personal accessory	Department stores	Other retailing	Cafes, restaurants and takeaway food services
Oct-20	5363.40	2095.60	1571.50	4357.10	3468.90
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Dec-20	5513.30	2395.30	1655.40	4503.30	3819.20
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Quartile 1	5448.925	2057.8	1520.725	4550.275	3458.1
Median	5511.25	2364.00	1647.10	4645.65	3813.00
Quartile 2	5554.825	2518.875	1686.75	4696.4	3936.85
Maximum	=MAX(C8:C19)	2631.70	1877.00	4793.90	4155.10

c)



- d) Data of household's goods turnover is positively skewed, the data of clothing, footwear, and personal items turnover is negatively skewed, the turnover data of department store is almost symmetric, the turnover data of other retailing is positively skewed, and the turnover data of cafes, etc. is negatively skewed.

Question:3

- a) Probability of randomly selected households lives in south Australia= population of households in Australia/total households

probability of randomly selected households living in South Australia **0.1167**

Reasons for accessing the internet in the last 3 months							
Victoria Queensland South Australia	Banking	Social networking	Purchasing goods or services	Entertainment	Formal educational activities	Health services	TOTAL
	'000	'000	'000	'000	'000	'000	0.00
	3469.70	3456.10	3129.40	3,507.9	1374.30	2035.40	13464.90
	2594.10	2584.40	2264.30	2,487.2	1010.90	1464.90	9918.60
	910.20	902.30	839.50	906.80	336.90	536.00	4431.70
Western Australia							
Tasmania	1457.10	1451.60	1320.60	1433.90	505.70	863.00	7031.90
Northern Territory Australian Capital Territory	271.00	274.30	263.00	274.20	87.90	153.00	1323.40
	97.80	103.30	92.40	88.80	40.50	51.10	473.90
	249.80	227.30	242.70	356.70	85.70	162.70	1324.90
TOTAL HOUSEHOLDS	9049.70	8999.30	8151.90	3060.40	3441.90	5266.10	37969.30
A)							
probability of randomly selected households lives in south australia= population of households in australia/total households							
probability of randomly selected households lives in south australia		=H6/H12					

- b) The probability that a randomly selected household lives in Queensland and accesses the internet for social networking purpose=people live in Queensland and accesses social networking / total population.
Probability is 0.06806516

Reasons for accessing the internet in the last 3 months							
Victoria Queensland South Australia	Banking	Social networking	Purchasing goods or services	Entertainment	Formal educational activities	Health services	TOTAL
	'000	'000	'000	'000	'000	'000	0.00
	3469.70	3456.10	3129.40	3,507.9	1374.30	2035.40	13464.90
	2594.10	2584.40	2264.30	2,487.2	1010.90	1464.90	9918.60
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Northern Territory Australian Capital Territory	271.00	274.30	263.00	274.20	87.90	153.00	1323.40
	97.80	103.30	92.40	88.80	40.50	51.10	473.90
	249.80	227.30	242.70	356.70	85.70	162.70	1324.90
TOTAL HOUSEHOLDS	9049.70	8999.30	8151.90	3060.40	3441.90	5266.10	37969.30
B)							
probability that a randomly selected household lives in Queensland and accesses the internet for social networking purpose=people lives in queensland and accesses social networking / total population							
probability		=C5/H12					

- c) the probability that a randomly selected household lives in Tasmania accesses the internet for formal educational activities= household lives in Tasmania accesses the internet for formal educational activities/ total households.
The probability is 0.002315.

Reasons for accessing the internet in the last 3 months							
Victoria Queensland South Australia	Banking	Social networking	Purchasing goods or services	Entertainment	Formal educational activities	Health services	TOTAL
	'000	'000	'000	'000	'000	'000	0.00
	3469.70	3456.10	3129.40	3,507.9	1374.30	2035.40	13464.90
	2594.10	2584.40	2264.30	2,487.2	1010.90	1464.90	9918.60
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	97.80	103.30	92.40	88.80	40.50	51.10	473.90
	249.80	227.30	242.70	356.70	85.70	162.70	1324.90
TOTAL HOUSEHOLDS	9049.70	8999.30	8151.90	3060.40	3441.90	5266.10	37969.30
c)							
probability that a randomly selected household lives in Tasmania accesses the internet for formal educational activities= household lives in Tasmania accesses the internet for formal educational ac							
probability	=F9/H12						

- d) the probability that a randomly selected household has accesses the internet for social networking or entertainment=household has accessed the internet for social networking or entertainment/Total households.

Reasons for accessing the internet in the last 3 months							
Victoria Queensland South Australia	Banking	Social networking	Purchasing goods or services	Entertainment	Formal educational activities	Health services	TOTAL
	'000	'000	'000	'000	'000	'000	0.00
	3469.70	3456.10	3129.40	3,507.9	1374.30	2035.40	13464.90
	2594.10	2584.40	2264.30	2,487.2	1010.90	1464.90	9918.60
	910.20	902.30	839.50	906.80	336.90	536.00	4431.70
Western Australia Tasmania	1457.10	1451.60	1320.60	1433.90	505.70	863.00	7031.90
Northern Territory Australian Capital Territory	271.00	274.30	263.00	274.20	87.90	153.00	1323.40
	97.80	103.30	92.40	88.80	40.50	51.10	473.90
	249.80	227.30	242.70	356.70	85.70	162.70	1324.90
TOTAL HOUSEHOLDS	9049.70	8999.30	8151.90	3060.40	3441.90	5266.10	37969.30
d)							
probability that a randomly selected household has accesses the internet for social networking or entertainment=household has accesses the internet for social networking or entertainment/Total ho							
probability	=E12/H12						

Question:4

- a)i) standard error= standard deviation/ square root of number of observations.

mean	3	minutes
standard deviation	20	seconds
number of patients	15	
standard Error	5.163978	seconds

mean	3	minutes
standard deviation	20	seconds
number of patients	30	
standard Error	3.651484	seconds

ii) when the sample of 40 patients is selected, the proportion of the sample mean between 90 seconds and 150 seconds will be 0.333. as the mean is 3 minutes or 180 seconds, for p1 we divided 90 seconds with 180 seconds, and for p2 we divided 150 seconds with 180 seconds, and finally took the difference of both to know the proportion of the sample mean between 90 seconds and 150 seconds.

P1	0.500
P2	0.8333333333
Pû	0.333

b) i) when the population is 1015 patients and the sample is 100 patients the standard error will be 2 seconds.

Standard error= standard deviation/ square root of the number of observations.

N	1050	
n	100	
standard deviation	20	seconds
standard error	2	

ii) The proportion of sample means that would be greater than 200 seconds is 0.19 seconds. We simply calculated by 200 with 1050.

c)

n	30		
P=	X1/30	P=	X2/30
70%=	X1/30	90%=	X2/30
X1=	70%*30	X2	90%*30
X1=	21	X2	27
Finally,			
P=	$\frac{x2-x1}{n}$	$=\frac{27-21}{30}$	$=0.2$
P=	0.2		

Question:5

a) 99% confidence interval for mean breaking weight of executive desk is (48.5,55.18).

mean	51.84
sample standard deviation	6.563994
alpha	1%
confidence level	99%
sample size	24
ta/2	t(0.005) 2.492
confidence interval	$(\bar{x} - ta/2 * S / \sqrt{n})$ to $(\bar{x} + ta/2 * S / \sqrt{n})$
CI	= 48.50271 TO 55.18062

b) The means population value of breaking weights lies between (48.5,55.18) with 99% confidence level, the table should be launched in the market if the weight of the computer is less than the lower range of confidence interval.

c) 95% confidence level when population standard deviation is known.

population standard deviation	4	Kg
mean	51.84	
confidence level	95%	
sample size	24	
	12.9604	
z-value	2	1.645
confidence interval	$(\bar{x} - Z * \text{population std} / \sqrt{n})$ to $(\bar{x} + Z * \text{population std} / \sqrt{n})$	
confidence interval	50.49853	to 53.1848

The difference between the calculation of confidence interval in part a) and part c) is that in part a) population standard deviation was unknown so we calculated the sample standard deviation (s), on the other hand in part c) population standard deviation was known which is denoted with sigma. On the other hand, when population standard deviation is unknown, we use a t-test and when population standard deviation is known we use z-statistics.

d) There will be two hypotheses, null hypothesis and alternative hypothesis. For the null hypothesis, we assume that the mean population breaking weight is equal to 0, and the alternative hypothesis will be that the mean population breaking weight is not equal to 0. we assume the same confidence level of 95% and will test the hypothesis by calculating z-statistics. So, if the p-value is less than 0.05 we will reject the null hypothesis that is mean

population breaking weight is equal to 0. As per the results in c) zero does not lie in the confidence interval we will be able to reject the null hypothesis.