Barrow solutions chapter 1

Statistics for Economics, Accounting and Business Studies Michael Barrow Solutions to End of Chapter Problems – Selected Chapters Chapter 1 – Problem number: 1. 1a) [pic] When comparing, you have to taken into consideration the difference in the sample size, which distorts the comparison. Comparing the two graphs, there seems to be more women than men with Other Qualification and more men with Higher Education. 1. 1b) [pic] Comparing the two graphs, there is an indication that there are more inactive women, especially in the Other Qualification and No Qualification groups. 1. 1c) [pic]

Outcome is very similar to Figure 1. 4, and the reasons are likely to be the same as well. 1. 1d) [pic] Not too dissimilar to Figure 1. 5, but comparatively a higher percentage of women with Other Qualifications (54. 4% vs. 41%) and lower percentage in the other categories. 1. 2a) The data in this exercise show median in each category, whereas exercise 1 showed count. Previous exercise was frequency and this exercise is monetary values. 1. 2b) [pic] Key conclusions from this bar chart are: • Salary reduces as employees are less qualified • Male salaries are higher than female salaries in all qualification levels . 2c)This data is not additive and stacked bar charts should only be used when data is additive, i. e. when you are using frequencies, not medians as in this case. To combine different sets of information like this, normally you would need to take a weighted average, but that would only work for means and you would need to know the number of males and females in the sample. For medians that can not be done. 1. 3a)Higher Education with 88% | | Higher Education | A Levels | Other Qualification | No Qualification | | In Work | 87. 82% | 80. 9% | 65. 57% | 35. 38% | |

Unemployed | 5. 04% | 4. 00% | 7. 73% | 12. 31% | | Inactive | 7. 14% | 15. 11% | 26. 70% | 52. 31% | 1. 3b)In Work with 20%. | | Higher Education | A Levels | Other Qualification | No Qualification | | In Work | 19. 72% | 17. 17% | 54. 43% | 8. 68% | | Unemployed | 9. 92% | 7. 44% | 56. 0% | 26. 45% | | Inactive | 4. 03% | 8. 06% | 55. 69% | 32. 23% | 1. 4a)156 for men (433 -277) and 145 for women (346 – 201) 1. 4b)The mean is more affected by outliers than the median, and as the likelihood is that the range of men's salaries is greater than the range of women's salaries, one would expect the difference of the means to be greater than the difference of the medians. 1. 5) [pic] 1. 6 [pic] 1. 7a)Note: all answers in 000s Mean = (Sum mid-point of each class * Number) / Sum of number = 322, 157. / 19, 645 = 16. 399 Median – (19. 645+1) / 2 = 9. 823, which is the position of the median; Median = (9, 823 – 7, 095 –cumulative frequency up to class 3-) / 3, 483 * 5 (class 4 size) + 5 (start of class 4) = 8. 916 Mode – by dividing each class by the width (e. g. 1606/1; 2927/2000; 2562/2000, etc), you will find that the class with the highest density is the first, which is were the mode is. 1. 7b)Q1 - (19, 645+1) / 4 = 4, 911, which is the position of Q1; Q1 = (4, 911 – 4, 533 –cumulative frequency up to class 2-) / 2, 562 * 2 + 3 = 3. 295 Q3 = 18. 34 and IQR = 15. 044 Variance = 652. 8 (sum of the square of the mid-points times the frequency for all classes -18, 108, 920- divided by the frequency -19, 645- minus the mean squared) Standard deviation = 25. 55 Coefficient of Variation = Standard Deviation / Mean = 1. 56 1. 7c)Coefficient of skewness = sum of [frequency * (mid-point – mean) cubed] for all classes divided by [total frequency times mean cubed] = 1, 875, 494, 700 / (19, 645 * 25. 55^3) = 5. 72 1. 7d)The conclusion are similar to the data in the chapter,

which is that wealth has got a skewed distribution, with a small number of individuals having a high percentage of the wealth.

Over time, there appears to have been no significant change. 1. 7e)The mean would now be 31. 115, but the more and the median are unaffected. 1. 8a)All calculations are similar to the calculations in Problem 1. 7. Mean = 33. 41; Median = 7. 54; Mode = in the first class. They differ because of the skewness of the distribution 1. 8b)Q1 = 3. 77; Q3 = 17. 82; IQR = 14. 05; Var. = 14, 885. 32; St. Dev. = 122. 01; C. V. = 3. 65 1. 8c)Coefficient of Skewness = 11. 16 1. 9)Average = (33*55. 7 + 40*59. 6 + 25*57)/(33+40+25) = 57. 62 pence per litre. 1. 0)Total expenditure = 8, 000*890 + 7, 000*1, 450 + 3, 000*1, 910 = 23, 000, 000 Total number of students = 8, 000 + 7, 000 + 3, 000 = 18, 000 23, 000, 000 / 18, 000 = 1, 277. 78 per student, as per equation 1. 9 1. 11a)Student A -> z = (83 – 65) / v144 = 18 / 12 = 1. 5 Student A -> z = (47 – 65) / v144 = -18 / 12 = -1. 5 1. 11b)Using Chebychev's Theorem with k = 1. 5, we have at least (1 – 1/1. 52) = 55. 56% lying within 1. 5 standard deviations of the mean, so at most 44. 44% outside that range. 1. 11c)As Chebyshev' theorem applies to both tails, we cannot answer about the number of students just above or just below 1. standard deviations, just the total outside. If the distribution is skewed, it would be wrong to simply divide the 44. 44%. 1. 121 – 1/k2 = 0. 8 lie within k standard deviations. So, k = v(-1/(0. 8-1)) = 2. 23. Distance between mean and range equal to 2, 000, so minimum standard deviation will be 2, 000 / 2. 23 = 896. 86. 1. 13a) [pic] The main conclusions from this data are: • Significant fall in registrations in 1972-74 and 1989-91 periods; • Period of

high growth from 1975 to 1989; • Overall, high volatility over the period 1. 13b) [pic]

While the difference in registrations year over year is very volatile, when the natural log and the difference in natural log, the series becomes very smooth around 5 in the case of the log and around 0 in the case of the difference of the log. 1. 14 [pic] [pic] While with the raw data, you can conclude that all variables have an upwards tendency over time, with the logged data you can additionally conclude that all variables are growing at a similar growth rate. 1. 15a)Methodology for calculating the values in Problems 15 and 16 are similar. Detailed calculations shown on exercise 16.

Average growth = 3. 2% 1. 15b)St. Dev. = 18. 89% 1. 15c)Coefficient of Variation = 5. 91, which suggests data to be a lot more volatile that the investment data in the chapter, which has a C. V. of 0. 815. Possible reasons for this difference are: • Investment includes various categories, with variations possibly cancelling each other out, while Registrations is a single set of data; • Registrations series is shorter, so effect of outlayers such as years 1972 and 1973 has a greater effect on the data; • Investment is nominal, so effect of prices may smooth the data. 1. 6a)To calculate growth rate, you take value for one year away from value for the following year and divide the difference by the value for year one (e. g (11, 932 – 10, 447) / 10, 447). This will give you 19 data points instead of 20. Mean will be the sum of all these growths divided by 19, which is 7. 05%. 1. 16b)To calculate the variance, you have to calculate the square of each growth rate (as above) and had the square, which will come to 0. 252. The variance will the be (0. 252 – 19 * 0. 0705^2)/19, and the standard deviation will be the square root

ot the variance, which is 0. 0934 or 9. 34%. 1. 16c)The coefficient of variation is 1. 2, which is higher than the 0. 815 calculated in the chapter, so it seems that this series is more volatile. While in the chapter, the analysis was done on the total investment, this exercise looks at only Dwellings, and generally looking at " simple" data tends to be more volatile than looking at " aggregate" data, as in the chapter, and that is confirmed by the comparison of the results in this exercise with the ones in the chapter. 1. 17a)Non-linear upward trend, likely with positive autocorrelation (i. e. a period of high growth more likely to be followed by another period of high growth and vice-versa), and heteroscedasticity, i. . variability around the trend growing over time. 1. 17b)Similar to a), but because Real Income is after inflation, the rate of growth would be lower than the rate of growth of the Nominal income, and therefore the trend would be shallower. As effect of price increases is taken out, autocorrelation is likely to be higher and heteroscedasticity is likely to be lower. 1. 17c)Long term interest rates are unlikely to show a trend, but short term movements are likely, with periods of growth (if inflation is increasing) and periods of reduction (if inflation is reducing) of rates.

Likely to be homocedastic, with some degree of autocorrelation. 1. 18a)Price level should be moderately upward for the majority of products. There would be exceptions, such as new technologies products, which tend to reduce price in the initial period after launch 1. 18b)Inflation rate in the majority of Western countries, including the UK has been stationary around the 3% level, so you would have a roughly flat line. In developing countries, one tends to observe a downward trend in inflation, given that, as the economy

develops, inflation tends to reduce. 1. 8c)In the last year or so (solution prepared in September 2007)) we have seen a downward trend in the ? /$ exchange rate, from close to 0. 54 to just over 0. 49. Historically, in the very long run, the trend has been upward with the $ gaining value versus the ? , but different periods we have also seen periods of stability, periods of fluctuation and sudden changes. 1. 19a)Price today = 1, 000 / (1. 07)^5 = 712. 99; Price in two years = 1, 000 / (1. 07)^3 = 819. 30; Price after two years at 10% = 1, 000 / (1. 10)^3 = 751. 31 1. 19b)P = 200/1. 07 * [(1-1/1. 07^5) / (1-1/1. 07)] = 820. 04

The difference is that in part a) you have a single payment in 5 years' time, whereas in part b) you are paid the same total amount but in five equal amounts, so you receive part of the money earlier, which makes it more valuable. 1. 20) 30, 000 * (1 – X)10 = 3, 000 (X = 1 - (3, 000 / 30, 000)1/10 = . 2057 = 20. 57% After 1 year = 30, 000 * (1 - . 2057) = 23, 829. 00 After 2 years = 30, 000 * (1 - . 2057)2 = 18, 927. 37 After 5 years = 30, 000 * (1 - . 2057)5 = 9, 485. 15 1. 21a) BMW (22, 275 * (1 – X)5 = 8, 300 (X = 1 - (8, 300 / 22, 275)1/5 = . 1792 = 17. 92% Mercedes (21, 900 * (1 – X)5 = 10, 300 (X = 1 - (10, 300 / 21, 900)1/5 = . 4 = 14% 1. 21b) | Year | BMW | Mercedes | | 1 | 22, 275 * (1 - . 1792) = 18, 283. 32 | 21, 900 * (1 - . 14) = 18, 834. 00 | | 2 | 18, 283. 32 * (1 - . 1792) = 15, 006. 95 | 18, 384. 00 * (1 - . 14) = 16, 197. 24 | | 3 | 15, 006. 95 * (1 - . 1792) = 12, 317. 70 | 16, 197. 24 * (1 - . 14) = 13, 929. 63 | | 4 | 12, 317. 70 * (1 - . 1792) = 10, 110. 7 | 13, 929. 63 * (1 - . 14) = 11, 979. 48 | | 5 | 10, 110. 37 * (1 - . 1792) = 8, 300. 00 | 11, 979. 48 * (1 - . 14) = 10, 300. 00 | 1. 21c) [pic] [pic] 1. 22)Using the formula for a perpetuity: PV = C/r, in this case PV = 400/0. 05 = 8, 000. 1.

23) [pic] 1. 24) [pic] 1. 25)This reasoning is comparing non-comparable averages. While both numbers may be true, they both average first-time and non-first-time buyers. First-time buyers are likely to have above average mortgages and therefore have below average equity levels. . 26)Using the hint, it is possible to create an example in which Arts' students are more successful in applying to both types of jobs, while overall appearing less successful. This happens because Arts' students apply more to the Popular jobs of which there are less. One possible situation would be represented in the example below, but you could try to develop others. | | Popular Jobs | Unpopular Jobs | Total Jobs | | Applic. | Suc. |% Suc. | Applic. | Suc. |% Suc. | Applic. | Suc. |% Suc. | Science | 200 | 174 | 0. 87 | 400 | 378 | 0. 945 | 600 | 552 | 0. 92 | | Arts | 400 | 350 | 0. 875 | 200 | 190 | 0. 95 | 600 | 540 | 0. 9 | | 1. 27)In this project, you would collect macroeconomic data related to GNP and tax levels for the UK, and treat it statistically, using the tools learned in this chapter to determine whether the claim is true or not. 1. 28)In this project, you would collect macroeconomic data related to employment and unemployment for the UK and other nations, and treat it statistically, using the tools learned in this chapter to determine whether the claim is true or not.