**Assignment 1 – Basic Statistics in Python**

**NOTE:**

1. **Solve all the questions in a Jupyter Notebook**
2. **The answers should be properly annotated**
3. The following is the frequency distribution of the number of telephone calls received in 245 successive one minute intervals at an exchange:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Number of Calls | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Frequency | 14 | 21 | 25 | 43 | 51 | 40 | 39 | 12 |

1. Write a Python program without using the built-in functions for the following :
2. Mean
3. Median
4. Mode
5. Range
6. Standard deviation
7. Variance
8. Using Matplotlib, describe the above visually using a suitable graph/plot
9. The following data gives the distribution of the marks of 100 students.

|  |  |
| --- | --- |
| Marks | Frequency (f) |
| Less than 10 | 5 |
| Less than 20 | 13 |
| Less than 30 | 20 |
| Less than 40 | 32 |
| Less than 50 | 60 |
| Less than 60 | 80 |
| Less than 70 | 90 |
| Less than 80 | 100 |

1. Write a Python program to calculate the range and quartiles of the above data
2. Represent the above data with the help of a suitable plot using Matplotlib
3. Write a Python program to calculate correlation from the following data.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | 67 | 97 | 84 | 78 | 73 | 68 | 91 | 87 | 75 |
| Hours of Studying | 20 | 40 | 36 | 34 | 33 | 28 | 42 | 32 | 25 |

1. Write a python program to simulate 100000 occurrences of a random variable Y which is equal to sum of two different random variables X and Z, where X follows a normal distribution with mean = 50 and variance = 20 and Z follows a Poisson distribution with mean = 40. Draw a histogram of the simulation
2. The table below lists the change in daily stock prices for 4 companies – Microsoft, GE, Intel and GM. Write a python program to make a side by side box plot for visualization of this data.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Microsoft** | **GE** | **Intel** | **GM** |
| **30-Mar-90** | **0.121519** | **0.040486** | **0.037267** | **0.022284** |
| **30-Apr-90** | **0.047404** | **-0.00389** | **-0.05389** | **-0.03542** |
| **31-May-90** | **0.258621** | **0.083516** | **0.221519** | **0.115819** |
| **29-Jun-90** | **0.041096** | **0.005445** | **-0.02591** | **-0.02057** |
| **31-Jul-90** | **-0.125** | **0.034296** | **-0.05319** | **-0.021** |
| **31-Aug-90** | **-0.07519** | **-0.13438** | **-0.25** | **-0.13137** |
| **28-Sep-90** | **0.02439** | **-0.11339** | **-0.00375** | **-0.08805** |
| **31-Oct-90** | **0.011905** | **-0.04587** | **0.007519** | **0.013793** |
| **30-Nov-90** | **0.133333** | **0.052885** | **0.119403** | **0.013605** |
| **31-Dec-90** | **0.041522** | **0.05726** | **0.026667** | **-0.05822** |
| **31-Jan-91** | **0.303987** | **0.115468** | **0.188312** | **0.054545** |
| **28-Feb-91** | **0.057325** | **0.070469** | **0.043716** | **0.10069** |
| **28-Mar-91** | **0.022892** | **0.023897** | **-0.02094** | **-0.0443** |
| **30-Apr-91** | **-0.06714** | **0.016158** | **0.053476** | **-0.05298** |
| **31-May-91** | **0.108586** | **0.099081** | **0.13198** | **0.217483** |
| **28-Jun-91** | **-0.06891** | **-0.04207** | **-0.16592** | **-0.05507** |
| **31-Jul-91** | **0.078899** | **-0.01014** | **0.010753** | **-0.02454** |
| **30-Aug-91** | **0.159864** | **0.022184** | **0.053191** | **-0.03396** |
| **30-Sep-91** | **0.043988** | **-0.06664** | **-0.14646** | **-0.01645** |
| **31-Oct-91** | **0.054775** | **-0.00541** | **-0.03846** | **-0.0602** |
| **29-Nov-91** | **0.035952** | **-0.06159** | **0.009231** | **-0.11317** |
| **31-Dec-91** | **0.143959** | **0.189961** | **0.195122** | **-0.06098** |
| **31-Jan-92** | **0.080899** | **-0.01634** | **0.221939** | **0.121212** |
| **28-Feb-92** | **0.027027** | **0.04485** | **0.060543** | **0.170656** |
| **31-Mar-92** | **-0.04049** | **-0.02957** | **-0.12992** | **-0.02333** |
| **30-Apr-92** | **-0.06962** | **0.011551** | **-0.03167** | **0.133106** |
| **29-May-92** | **0.097506** | **-0.00326** | **-0.06542** | **-0.03916** |
| **30-Jun-92** | **-0.13223** | **0.025205** | **0.14** | **0.11348** |
| **31-Jul-92** | **0.039286** | **-0.01608** | **0.048246** | **-0.05398** |
| **31-Aug-92** | **0.024055** | **-0.03268** | **-0.02929** | **-0.15856** |
| **30-Sep-92** | **0.080537** | **0.065405** | **0.133621** | **-0.0722** |
| **30-Oct-92** | **0.102484** | **-0.01917** | **0.028137** | **-0.0428** |
| **30-Nov-92** | **0.049296** | **0.084691** | **0.059259** | **0.055285** |
| **31-Dec-92** | **-0.08322** | **0.034595** | **0.216783** | **0** |
| **29-Jan-93** | **0.013177** | **0.00731** | **0.228161** | **0.170543** |
| **26-Feb-93** | **-0.03613** | **-0.02322** | **0.091335** | **-0.00795** |
| **31-Mar-93** | **0.109445** | **0.066924** | **-0.01288** | **0.010067** |
| **30-Apr-93** | **-0.07568** | **0.01683** | **-0.17196** | **0.086379** |
| **28-May-93** | **0.083333** | **0.023448** | **0.165572** | **-0.01346** |
| **30-Jun-93** | **-0.04993** | **0.039137** | **-0.00789** | **0.109034** |
| **30-Jul-93** | **-0.15909** | **0.028721** | **-0.04909** | **0.089888** |
| **31-Aug-93** | **0.015203** | **-0.00254** | **0.229665** | **-0.02938** |
| **30-Sep-93** | **0.09817** | **-0.01776** | **0.101167** | **-0.10933** |
| **29-Oct-93** | **-0.02879** | **0.011734** | **-0.1053** | **0.140719** |
| **30-Nov-93** | **-0.00156** | **0.014175** | **-0.02767** | **0.111811** |
| **31-Dec-93** | **0.007813** | **0.073393** | **0.00813** | **0.040284** |
| **31-Jan-94** | **0.055814** | **0.027414** | **0.053226** | **0.116173** |
| **28-Feb-94** | **-0.03084** | **-0.02204** | **0.05364** | **-0.04571** |
| **31-Mar-94** | **0.027273** | **-0.04418** | **-0.01818** | **-0.07511** |
| **29-Apr-94** | **0.091445** | **-0.0475** | **-0.09556** | **0.053364** |
| **31-May-94** | **0.162162** | **0.044619** | **0.02459** | **-0.04934** |
| **30-Jun-94** | **-0.03953** | **-0.05558** | **-0.064** | **-0.06512** |
| **29-Jul-94** | **-0.00242** | **0.080429** | **0.013932** | **0.022388** |
| **31-Aug-94** | **0.128641** | **-0.01241** | **0.109705** | **-0.018** |
| **30-Sep-94** | **-0.03441** | **-0.02543** | **-0.06464** | **-0.06716** |
| **31-Oct-94** | **0.122494** | **0.015584** | **0.011138** | **-0.15733** |
| **30-Nov-94** | **-0.00198** | **-0.05882** | **0.016097** | **-0.02975** |
| **30-Dec-94** | **-0.02783** | **0.117609** | **0.011881** | **0.104918** |
| **31-Jan-95** | **-0.02863** | **0.009804** | **0.087045** | **-0.07715** |
| **28-Feb-95** | **0.061053** | **0.063107** | **0.14955** | **0.101608** |
| **31-Mar-95** | **0.128968** | **-0.00621** | **0.064263** | **0.032258** |
| **28-Apr-95** | **0.149385** | **0.037037** | **0.206892** | **0.025568** |
| **31-May-95** | **0.035933** | **0.035714** | **0.096459** | **0.07036** |
| **30-Jun-95** | **0.067159** | **-0.02095** | **0.128062** | **-0.02344** |
| **31-Jul-95** | **0.001383** | **0.046563** | **0.027285** | **0.04** |
| **31-Aug-95** | **0.022099** | **-0.00212** | **-0.05577** | **-0.02718** |
| **29-Sep-95** | **-0.02162** | **0.089766** | **-0.01833** | **-0.00531** |
| **31-Oct-95** | **0.104972** | **-0.00784** | **0.160415** | **-0.06667** |
| **30-Nov-95** | **-0.12875** | **0.061265** | **-0.1288** | **0.115429** |
| **29-Dec-95** | **0.007174** | **0.079479** | **-0.06776** | **0.090206** |
| **31-Jan-96** | **0.054131** | **0.065972** | **-0.026** | **-0.00473** |
| **29-Feb-96** | **0.066892** | **-0.01629** | **0.064781** | **-0.01853** |
| **29-Mar-96** | **0.044965** | **0.03755** | **-0.03294** | **0.039024** |
| **30-Apr-96** | **0.098182** | **-0.00803** | **0.191912** | **0.018779** |
| **31-May-96** | **0.048565** | **0.071197** | **0.114391** | **0.023502** |
| **28-Jun-96** | **0.011579** | **0.048338** | **-0.02732** | **-0.04989** |
| **31-Jul-96** | **-0.01873** | **-0.04657** | **0.02366** | **-0.06921** |
| **30-Aug-96** | **0.039236** | **0.010638** | **0.062396** | **0.026154** |
| **30-Sep-96** | **0.076531** | **0.100271** | **0.195771** | **-0.03275** |
| **31-Oct-96** | **0.040758** | **0.063187** | **0.151801** | **0.117188** |
| **29-Nov-96** | **0.142987** | **0.074935** | **0.154721** | **0.082051** |
| **31-Dec-96** | **0.053386** | **-0.04428** | **0.03202** | **-0.03254** |
| **31-Jan-97** | **0.234493** | **0.046776** | **0.239523** | **0.058296** |
| **28-Feb-97** | **-0.04412** | **-0.00604** | **-0.12558** | **-0.01059** |
| **31-Mar-97** | **-0.05962** | **-0.03018** | **-0.01938** | **-0.0432** |
| **30-Apr-97** | **0.325153** | **0.118388** | **0.100988** | **0.045147** |
| **30-May-97** | **0.020576** | **0.087838** | **-0.01061** | **2.31E-10** |
| **30-Jun-97** | **0.019153** | **0.076605** | **-0.06394** | **-0.02832** |
| **31-Jul-97** | **0.119683** | **0.082846** | **0.295267** | **0.109865** |
| **29-Aug-97** | **-0.06581** | **-0.10784** | **0.003404** | **0.022222** |
| **30-Sep-97** | **0.000946** | **0.092068** | **0.002035** | **0.066733** |
| **31-Oct-97** | **-0.01748** | **-0.05051** | **-0.16555** | **-0.04108** |
| **28-Nov-97** | **0.088462** | **0.143133** | **0.008117** | **-0.04284** |
| **31-Dec-97** | **-0.08657** | **-0.00271** | **-0.09501** | **0.058036** |
| **30-Jan-98** | **0.154255** | **0.056218** | **0.153452** | **-0.0463** |
| **27-Feb-98** | **0.136154** | **0.003226** | **0.107253** | **0.19849** |
| **31-Mar-98** | **0.056047** | **0.112379** | **-0.12962** | **-0.01723** |
| **30-Apr-98** | **0.006983** | **-0.0116** | **0.035612** | **-0.00554** |
| **29-May-98** | **-0.05895** | **-0.02128** | **-0.11601** | **0.074212** |
| **30-Jun-98** | **0.277819** | **0.089955** | **0.03762** | **-0.07043** |
| **31-Jul-98** | **0.014418** | **-0.01252** | **0.139123** | **0.08232** |
| **31-Aug-98** | **-0.12735** | **-0.10552** | **-0.15657** | **-0.18928** |
| **30-Sep-98** | **0.147231** | **-0.00172** | **0.204565** | **-0.05591** |
| **30-Oct-98** | **-0.03805** | **0.099764** | **0.040087** | **0.151481** |
| **30-Nov-98** | **0.152302** | **0.032857** | **0.207176** | **0.113749** |
| **31-Dec-98** | **0.136783** | **0.132503** | **0.101626** | **0.02415** |
| **29-Jan-99** | **0.26183** | **0.028186** | **0.188719** | **0.254148** |
| **26-Feb-99** | **-0.14214** | **-0.0435** | **-0.14872** | **-0.07451** |
| **31-Mar-99** | **0.194005** | **0.106293** | **-0.00886** | **0.054353** |
| **30-Apr-99** | **-0.09275** | **-0.04746** | **0.029443** | **0.023707** |
| **28-May-99** | **-0.00769** | **-0.03499** | **-0.11596** | **-0.08379** |
| **30-Jun-99** | **0.117738** | **0.111248** | **0.100578** | **-0.04348** |
| **30-Jul-99** | **-0.04851** | **-0.0323** | **0.159664** | **-0.07386** |
| **31-Aug-99** | **0.07866** | **0.03039** | **0.191558** | **0.092025** |
| **30-Sep-99** | **-0.02161** | **0.058765** | **-0.09582** | **-0.05** |
| **29-Oct-99** | **0.022084** | **0.142857** | **0.042052** | **0.119166** |
| **30-Nov-99** | **-0.01637** | **-0.03967** | **-0.0093** | **0.029281** |
| **31-Dec-99** | **0.282306** | **0.192392** | **0.07335** | **0.009549** |
| **31-Jan-00** | **-0.16167** | **-0.13651** | **0.201974** | **0.108341** |
| **29-Feb-00** | **-0.08685** | **-0.00935** | **0.142438** | **-0.04965** |
| **31-Mar-00** | **0.188811** | **0.178735** | **0.167589** | **0.088743** |
| **28-Apr-00** | **-0.34353** | **0.010442** | **-0.03884** | **0.130566** |
| **31-May-00** | **-0.10305** | **0.005167** | **-0.01652** | **-0.24032** |
| **30-Jun-00** | **0.278721** | **0.005931** | **0.07218** | **-0.17788** |
| **31-Jul-00** | **-0.12734** | **-0.0269** | **-0.0014** | **-0.01938** |
| **31-Aug-00** | **0** | **0.140948** | **0.121948** | **0.276619** |
| **29-Sep-00** | **-0.13608** | **-0.01471** | **-0.44491** | **-0.09957** |
| **31-Oct-00** | **0.141969** | **-0.04984** | **0.082707** | **-0.04423** |
| **30-Nov-00** | **-0.16697** | **-0.09578** | **-0.15372** | **-0.19517** |
| **29-Dec-00** | **-0.24401** | **-0.02956** | **-0.21018** | **0.02904** |