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(base) C:\Users\Bea\Documents\Python Scripts\pre-work>python pre-work-math-n-stats.py
==Experimental Design==


i - Statistical units are the surveyed adults both in 1971 and in 2006.
    Sampling method unknown, hopefully random, but answering a health survey
    usually implies being concerned about your health, so some bias is to be
    expected. Also, the non-response rate regarding phisical activity is
    noticeable, making it unclear whether the results are representative.

ii - Response variables: BMI
     Explanatory variables: intake level, activity level, survey year

iii - It is observational, since no intervention by the scientists was made.

iv - No.

v - I guess there are more explanatory variables than those taken into account.
    Or maybe the definition of the same variables has changed.


==Single Variable==


i - Mean: 12.22
    Median: 11.50
    Mode: 11 (4 times)

ii - Standard deviation: 5.96
     IQR: 9.00

iii - Skewness: 0.21
      Kurtosis: -0.35

iv - Distribution of frequencies using 9 bins:
[4 4 5 9 4 6 7 0 1]
     Cummulative frequencies using 9 bins:
[ 1.  8. 13. 22. 29. 35. 39. 39. 40.]
```

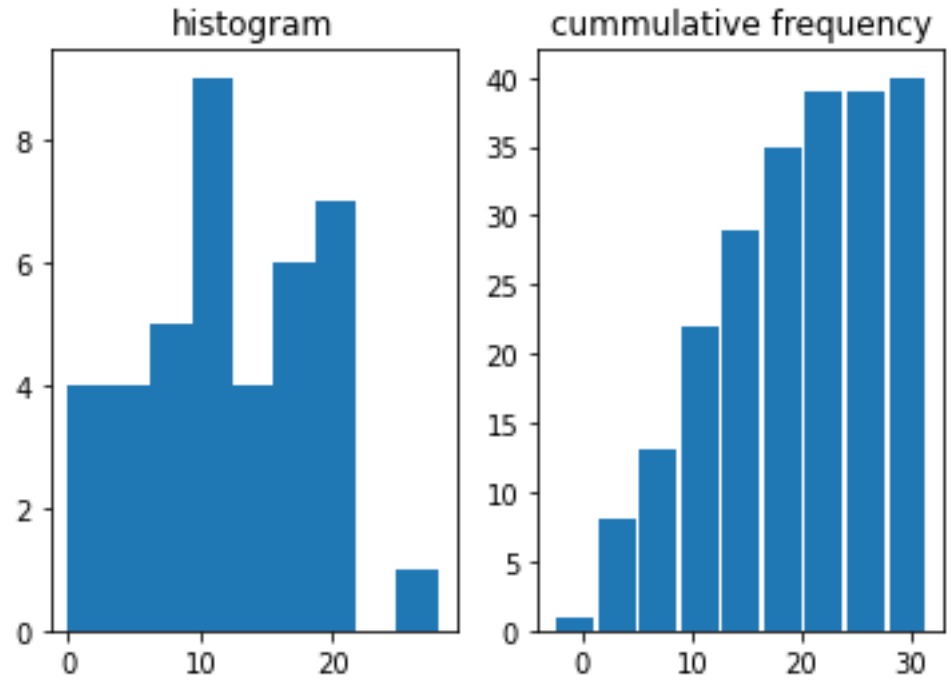
v - I could have let the software decide, but since we had all integers and the max value was 28, I decided to use 27 bins of size 1 for a first run, but the results were too noisy. Then, I decided to divide the number of bins by three (i.e. bins=9), in the aim of obtaining bins stretching from integer to integer, so that the obtained classes were simpler to read and also the result had a much better look, so I kept that value at 9.

vi - Aproximated Mean: 12.21
Aproximated Median: 10.89
Aproximated Mode: 10.89 (9 times)

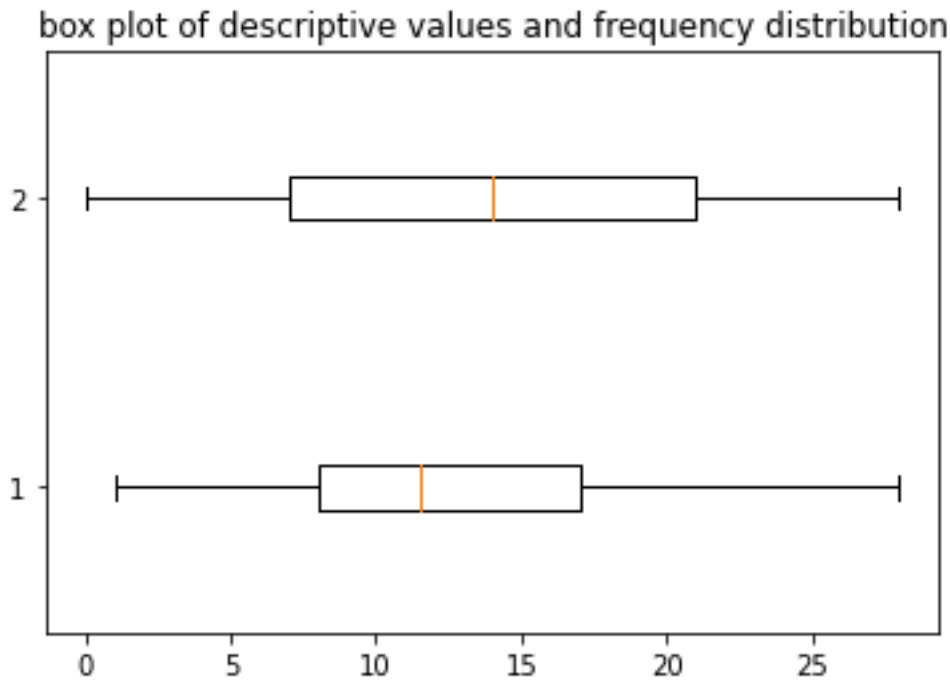
Vii - Aproximated Standard Deviation: 6.33
Aproximated IQR: 9.33

viii - Aproximated Skewness: 0.02
Aproximated Kurtosis: -0.83

ix - See plot



x - See plot



xi - No, they depend on the bin size.

xii - They are pretty similar, but of course not the same since we rely on an approximation.
I would use the aproximated values since they give me a little bit of independence from the observations and because they use less computing power (in the end, they are less numbers).

xiii - The distribution is bimodal, right-skewed and platykurtic.

xiv - As corresponds to a right-skewed distribution, the mean (12.21) is higher than the median (10.89). Most observations most fall within IQR (9.33), with some outliers falling in the higher bin
Using median and std deviation allows for more robust results than mean and std deviation.

==Bidimensional Distribution==

i - The variables have a relationship, their association is linear, strong
    and positive.
    As per correlation, apparently there is, but we are lacking
    information to affirm anything beyond a spurious one.

ii - The linear correlation coefficient is positive.

iii - Given that we have identified a relationship between the variables
      with a positive correlation, we could calculate the probability of the
      dependent variable falling within a certain range given a certain value
      of the independen variable.
      I have no idea how to do that so far, but I hope to be able by the end
      of the Bootcamp :-\)