**Task 1**

**Question 1**: You survey households in your area to find the average rent they are paying. Find the standard deviation from the following data

$1550, $1700, $900, $850, $1000, $950

Mean of the above numbers = 1550+1770+900+850+1000+950 = 1170

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Difference of each data point from the mean:-

1. 1550 - 1170 = 380

2. 1770 - 1170 = 600

3. 900 - 1170 = -270

4. 850 - 1170 = -320

5. 1000 - 1170 = -170

6. 950-1170 = -220

Squaring the equivalent values derived from the above calculation:-

1. Square of 380 = 144400

2. Square of 600 = 360000

3. Square of -270 = 72900

4. Square of -320 = 102400

5. Square of -170 = 28900

6. Square of -220 = 48400

Average of Square of the above numbers(i,e-Variance)= 144400+360000+72900+102400+28900+48400 = 126166.6666666667

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**Standard Deviation of the above numbers(Square root of Variance) = sqrt(126166.6666666667)=355.1994744740858**

**Question 2**: Find the variance for the following set of data representing trees in California (heights in feet):

3, 21, 98, 203, 17, 9

Mean of the above numbers = 3+21+98+203+17+9 = 58.5

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Difference of each data point from the mean:-

1. 3 - 58.5 = -55.5

2. 21 - 58.5 = -37.5

3. 98 - 58.5 = 39.5

4. 203 - 58.5 = 144.5

5. 17 - 58.5 = -41.5

6. 9 - 58.5 = -49.5

Squaring the equivalent values derived from the above calculation:-

1. Square of -55.5 = 3080.25

2. Square of -37.5 = 1406.25

3. Square of 39.5 = 1560.25

4. Square of 144.5 = 20880.25

5. Square of -41.5 = 1722.25

6. Square of -49.5 = 2450.25

**Variance of the above numbers = 3080.25+1406.25+1560.25+20880.25+1722.25+2450.25 = 5183.25**

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**Question 3**:In a class on 100 students, 80 students passed in all subjects, 10 failed in one subject, 7 failed in two subjects and 3 failed in three subjects.

Find the probability distribution of the variable for number of subjects a student from the given class has failed in.

**P(x=0) is the probability of a student who failed in zero subject = 80/100 = 0.8 = 80%**

**P(x=1) is the probability of a student who failed in one subject = 10/100 = 0.1 = 10%**

**P(x=2) is the probability of a student who failed in two subject = 7/100 = 0.07= 7%**

**P(x=3) is the probability of a student who failed in three subject = 3/100 = 0.03= 3%**

**Task 2**

**Question 1:**A test is conducted which is consisting of 20 MCQs (multiple choices questions) with every MCQ having its four options out of which only one is correct. Determine the probability that a person undertaking that test has answered exactly 5 questions wrong.

Input Parameters :-

n(Number of total questions) = 20

x(Number of wrong answer out of total questions) = 5

y(Number of correct answer out of total questions) = 20-5 = 15

P(Probability of wrong answer per question) = 3/4

Q(Probability of correct answer per question) = 1-3/4 = 1/4

Output :-

Formula for calculating probability = nCx.P^x.Q^y

Probability of exactly 5 questions answered wrong is P(x=5)

**P(x=5) = 20C5\*(3/4)^5\*(1/4)^15**

**So, 15504 \* 0.2373046875 \* 0.000000000931322574615478515625 = 3.426495823077857494354248046875e-6**

**Question 2:**A die marked A to E is rolled 50 times. Find the probability of getting a “D” exactly 5 times.

Input Parameters :-

n(Number of total rollings) = 50

x(Number of getting "D" exactly 5 times) = 5

y(Number of not getting "D") = 50-5 = 45

P(Probability of getting "D" per rolling) = 1/5

Q(Probability of not getting "D" per rolling) = 1-1/5 = 4/5

Output :-

P(x) = nCx.P^x.Q^y

**P(x=5) = 50C5\*(1/5)^5\*(4/5)^45 = 2118760 \*** **0.00032 \* 1.40737488355328e-31 = 9.54204674648751210496e-29**

**Question 3:**Two balls are drawn at random in succession without replacement from an urn containing 4 red balls and 6 black balls.

Find the probabilities of all the possible outcomes.

n = 4 red+6 black = 10

As because there is no replacement of ball in the urn,

so after first pick the value for n becomes 9 by means of either n = 4 red + 5 black or n = 3 red + 6 black

**P(Both balls are black) = (6/10)\*(5/9) = 30/90 = 1/3 = 0.3333333333333333 = 33.33%**

**P(First ball is red and second ball is black) = (4/10)\*(6/9) = 24/90 = 0.2666666666666667 = 26.66%**

**P(First ball is black and second ball is red) = (6/10)\*(4/9) = 24/90 = 0.2666666666666667 = 26.66%**

**P(Both balls are red) = (4/10)\*(3/9) = 12/90 = 0.1333333333333333 = 13.33%**