**Task 1:**

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.

**Steps for finding the standard deviation**

1. Work out the Mean (the simple average of the numbers)

2. Then for each number: subtract the Mean and square the result

3. Then work out the mean of those squared differences.

4. Take the square root to get the standard deviation.

**Step 1** – Calculation of Mean

(1550+1700+900+850+1000+950) / 6 = **1158.33**

**Step 2** – subtract the Mean and square the result

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data** | **X-Mean** | **(X-Mean)^2** |
| 1 | 1550 | 391.67 | 153402.80 |
| 2 | 1700 | 541.67 | 293402.81 |
| 3 | 900 | -258.33 | 66736.09 |
| 4 | 850 | -308.33 | 95069.42 |
| 5 | 1000 | -158.33 | 25069.43 |
| 6 | 950 | -208.33 | 43402.76 |
| **Mean - 1158.33** | | **Total - 677083.3** | |

**Step 3** – Mean of the squared differences - variance

677083.3/(6-1) = **135416.7**

**Step 4** – square root of the above number

Standard Deviation (√135416.7)= **367.99**

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

**3, 21, 98, 203, 17, 9**

**Step 1** – Calculation of Mean

(3+21+98+203+17+9) / 6 = **58.5**

**Step 2** – subtract the Mean and square the result

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data** | **X - Mean** | **(X - Mean)^2** |
| 1 | 3 | -55.5 | 3080.25 |
| 2 | 21 | -37.5 | 1406.25 |
| 3 | 98 | 39.5 | 1560.25 |
| 4 | 203 | 144.5 | 20880.25 |
| 5 | 17 | -41.5 | 1722.25 |
| 6 | 9 | -49.5 | 2450.25 |
| **Mean - 58.5** | | **Total - 31099.5** | |

**Step 3** – Mean of the squared differences - variance

Variance is 31099.5/(6-1) = **6219.9**

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.

**Solution**

probability of failing in 0 subjects, P(X=0) =80/100 =0.8  
probability of failing in 1 subjects, P(X=1) =10/100 = 0.1  
probability of failing in 2 subjects, P(X=2) =7/100 = 0.07  
probability of failing in 3 subjects, P(X=3) = 3/100 = 0.03

The probability distribution can be shown as:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 |
| P(X) | 0.8 | 0.1 | 0.07 | 0.03 |

**TASK 2 :**

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.

**Solution –**

Let’s consider No. of MCQs, n = 20

5 questions are wrong so, n - k = 5

Hence, k = 20 - 5 = 15

Here the probability of success = probability of giving a right answer = s = 1/4

Hence, the probability of failure = probability of giving a wrong answer = 1 - s = 1 – 1/4 = 3/4

C(20,5) = 20! / 15!\*5! = (20\*19\*18\*17\*16) / (5\*4\*3\*2\*1) = 15504

P (5 out of 20) = 15504\* (1/4) ^ 15 \* (3/4) ^ 5 = 0.00000342649

So, the required probability is 0.0000034 approximately.

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

**Solution** –

So, n = 50

k = 5

n - k = 45.

The probability of success = probability of getting a “D”= s = 1/5

Hence, the probability of failure = probability of not getting a “D” = 1 - s = 4/5.

1. 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.

**Solution –**

First determine the probabilities of the events.

Events Probability

RR = (4/10)(3/9) = 2/15

RB = (4/10)(6/9) = 4/15

BR = (6/10)(4/9) = 4/15

BB = (6/10)(5/9) = 1/3

RR - P( 0 black balls) is 2/15

RB or BR - P (1 black ball) is 4/15+4/15 = 8/15

BB – P(2 black balls) is 1/3

So the probability of all the possible outcomes is

P(0) = 2/15

P(1) = 8/15

P(2) = 1/3