

Teachers Teaching with Technology

T³ Scotland



T³ EUROPE

Statistics

Mean and Variance of Discrete Random Variables

Higher Statistics Mean and Variance of Discrete Random Variables

Let X be a discrete random variable taking values x_1, x_2, \dots, x_n with probabilities p_1, p_2, \dots, p_n . The variance of X , denoted by σ^2 , is the number

$$\sigma^2 = (x_1 - \mu)^2 p_1 + (x_2 - \mu)^2 p_2 + \dots + (x_n - \mu)^2 p_n$$

The standard deviation σ of x is the square root of the variance

When given the probability distribution of a random variable X , the Ti-83 list facility can be used to find the mean and standard deviation.

Example 1

Let the output of the random variable X denote the number of defective computer parts in a shipment of 400.

The following table gives the probability density function (pdf) of X

X	0	1	2	3	4	5
Pdf(x)	0.02	0.2	0.3	0.3	0.1	0.08

Compute the mean and standard deviation.

Solution:

Input the values given in L1 and L2 (Fig 1)

L1	L2	L3	2
0	.02	---	
1	.2	---	
2	.3	---	
3	.3	---	
4	.1	---	
5	.08	---	
L2(7) =			

Calculate the mean and standard deviation

Use STAT CALC 1: 1-Var Stats (Fig 2) followed by the list name (Fig 3).

```

1-Var Stats L1,L2
2
    
```

Fig 2

```

EDIT 2nd TESTS
1 1-Var Stats
2 2-Var Stats
3 Med-Med
4 LinReg(ax+b)
5 QuadReg
6 CubicReg
7 QuartReg
    
```

Fig 3

This gives

```

1-Var Stats
x̄=2.5
Mx̄=2.5
Sx̄=1.7
sx=1.204159458
n=1
    
```

Exercises

1. A random variable X has a probability density function given by:

X	-2	-1	0	1	2
$\text{Pdf}(x)$	0.3	0.2	0.1	0.3	0.1

Compute the mean and standard deviation

2. Bluetits always lay three eggs.
The number of eggs, X , which hatch has the following probability distribution.

X	0	1	2	3
$\text{Pdf}(x)$	0.1	0.3	0.4	0.2

Compute the mean and standard deviation