

STATISTICAL DATA

Class Level: 11th Grade

Objectives:

- Verilen bir gerçek yaşam durumuna uygun serpilme grafiđi ve kutu grafiđi çizer ve bu grafikler üzerinden çıkarımlarda bulunur.
- Verilen bir gerçek yaşam durumunu yansıtabilecek en uygun grafik türünün hangisi olduğuna karar verir, grafiđi oluşturur ve verilen bir grafiđi yorumlar.
- Merkezi eğilim ve yayılım ölçüleri kullanılarak gerçek yaşam durumları için hangi eğilim veya yayılım ölçüsünü kullanması gerektiđine karar verir.

Necessary Materials: TI-84 Calculator, pencil, QR code reader, computer, spreadsheet, TI connect application

Time required: 60 minutes

Instructions

Task 1: In this worksheet, you are going to obtain a data set of interest to you that you will use for this worksheet. The data set should contain at least one qualitative variable and one quantitative variable, although having tow of each will be necessary in some cases. You should have at least two variables.

Here some examples of the procedures to use to obtain data:

1. Take a random sample of used cars and collect data on them. You may use websites like sahibinden.com, cars.com and so forth. Quantitative variables may include the price, mileage, and age of car. Categorical variables may include the model, type and so forth. You can concentrate on your favorite type of car, or look at a variety of types.
2. Examine the real estate ads in newspaper or online and obtain information on rental properties or houses for sale.

3. Take a random sample of your face book friends and look how many friends they have.
4. If you are a sports fan, you can use website to obtain statistics on a random sample of athletes. You can look at sport-specific statistics such as position, scores and so forth in soccer, or you could collect information to compare different sports by gathering information on salary, career length, weight and so forth.

Task 2: Once you have collected the information, answer the following tasks/questions:

1. Describe the variable that you have collected information on.
2. Describe a reasonable target population for the sample you used.
3. Is your sample a random sample from this target population?
4. Do you feel that your sample is representative of this population?
5. For each quantitative variable, state whether it is continuous or discrete.
6. Describe the meaning of a variable, and a measurement for this data set.

7. Describe any problems you faced in collecting these data.

Task 3: Define a suitable distribution for your data. If your variables are continuous, use normal distribution, or if your variables are discrete, use Poisson distribution.

Task 4: To analyze data, enter your data into TI-84 calculator. In order enter your data into TI-84 calculator, press STAT and press 1 to EDIT. Load your data into L1 as it shown in the figure.

L1	L2	L3
52000	-----	-----
87000		
50000		
13500		
68000		
50000		
73000		
L1()=52000		

This is my mileage data for BMW 5.20d, the model year 2011 (taken from sahibinden.com).

- The mean of my distribution is 55110
- The standard deviation of my distribution is 18654.99665
- The variance of my distribution is 19664.09305

To find mean, variance and standard deviation, push STAT and with arrow keys move right to CALC. Choose 1 to calculate the 1-var stats. Press enter.

```

EDIT  [2nd][DEL] TESTS
1:1-Var Stats      1-Var Stats
2:2-Var Stats     x=55110
3:Med-Med        Σx=551100
4:LinReg(ax+b)   Σx²=3.38512e10
5:QuadReg        Sx=19664.09305
6:CubicReg       σx=18654.99665
7:QuartReg       ↓n=10
  
```

Task 5: Using your graph calculator

- Find the mean for your data
- Find the variance for your data
- Find the standard deviation for your data

d. What is the formula of probability generating function?

e. Draw your data accurately on set of axes. Take a screen shot and paste on the worksheet.

Task 6: a) If your distribution is Poisson distribution, then compare your actual data with that generated by the Poisson model.

For example:

A call centre receives the following distribution of phone calls, X in number, between 10:00 am and 10:15 am on Mondays:

X	0	1	2	3	4	5	6
Frequency	13	27	27	19	9	4	1

Press STAT, ENTER and enter the X values into L1 and the frequency values into L2.

L1	L2	L3
0	13	
1	27	
2	27	
3	19	
4	9	
5	4	
6	1	

L3()=

Calculate statistics for the distribution pressing STAT> CALC and ENTER.

Enter 2nd L1 , 2nd L2 ENTER to see the statistics.

```

1-Var-Stat:
x̄=2
Σx=200
Σx²=586
Sx=1.370688834
σx=1.36381817
↓n=100

```

Note that the mean is 2 and the number of data points is 100

To calculate the theoretical data generated by the Poisson distribution, follow these steps:

Press 2nd DISTR ALPHA C to select the poissonpdf() function.

Now enter the values of X (List1), and the mean of 2 by pressing 2, 2nd L1

Now multiply the result by the number of data points (100) and store this in List3 by pressing $\times 100$ STO> L3 ENTER.

```
Poissonpdf(2,L1)
*100>L3
(13.53352832 27...
```

Now press STAT ENTER to compare the actual data in List2 with the theoretical data in List 3.

L1	L2	L3	3
0	13	13.5335	
1	27	27.067	
2	27	27.067	
3	19	18.045	
4	9	9.0224	
5	4	3.6089	
6	1	1.203	

L3(1)=13.53352832...

b) If your distribution is normal distribution, draw a normal distribution curve and calculate probabilities of your data.

For example:

To draw a normal distribution curve and calculate probabilities:

Press Y= to the enter graphing editor and then press 2nd DISTR and 1 to choose normalpdf()

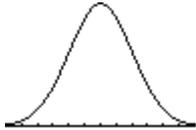
Enter your variable, mean and standard deviation and press ENTER

```
Plot1 Plot2 Plot3
\Y1=normalpdf(X,
10,2)
\Z=
\Z=
\Z=
\Z=
\Z=
\Z=
```

Press WINDOW to display the window editor. This is where you can view and edit the values of the window variables.

```
WINDOW
Xmin=4
Xmax=16
Xscl=1
Ymin=0
Ymax=.2
Yscl=1
Xres=1
```

Press GRAPH to draw graph



Press 2nd DISTR then scroll to DRAW and press 1 to choose 1:Shadenorm(

Enter lower, upper, mean, and standard deviation

Enter the details as shown:

```
ShadeNorm(8,11,1  
0,2)
```



To calculate probabilities from a normal distribution directly:

Press 2nd DISTR and 2 to choose 2:normalcdf(to compute a normal distribution probability.

```
1: normalcdf(  
2:normalcdf(  
3: invNorm(  
4: pdf(  
5: tcdf(  
6: x²cdf(  
7: x²cdf(  
DRAW
```

Enter lower, upper, mean and standard deviation

```
normalcdf(8,11,1  
0,2) .5328072082
```

Task 7: JUST FOR FUN!

Download an application for QR code to read below. Then, have fun😊



Reflection

When I tried to prepare this worksheet, I first decided to do statistics. Then, it came too hard to me because I could not remember statistics from my previous knowledge. I chose one of the calculus topics. However, I did not want to do either. I forced myself to learn statistics because I know I have learn eventually. I searched web and also books to learn how to write questions. I combined to all my findings and prepared a worksheet which is also suitable for MONE objectives.