WORKSHEET 2

Coffee is a nearly traditional drink that nearly all families drink in the breakfast or after the meal. It varies from place to place and culture to culture. For example, Turks usually drink Turkish coffee and Americans prefer filter coffee. Drinking coffee has both sides for health; benefits and harms according to the caffeine rate in it.

Today, you will calculate the caffeine rate in the blood and its change according to the time variable. Suppose you drink one cup of Turkish coffee. It contains nearly 48 mg. of caffeine. Examine the following time and caffeine table. If the amount of caffeine in your body were monitored over the next 19 hours, the result would be similar to the data in the table.

Caffeine Elimination Rate			
Time (hrs)	Caffeine (mg)	Time (hrs)	Caffeine (mg)
0	48.00	10	4.78
1	38.11	11	3.80
2	30.26	12	3.01
3	24.03	13	2.39
4	19.18	14	1.90
5	15.15	15	1.51
6	12.03	16	1.20
7	9.55	17	0.95
8	7.58	18	0.76
9	6.02	19	0.60

Create this table by using Excel spreadsheet. Open an excel page on your computer. By starting from A1, create this table. There will be two columns; one for time and the other one for caffeine.

After this preparation, connect your TI 84 to the computer. Download CellSheet Converter application to your computer from TI education and install it. After installation there will be "TI Tools" on the menu bar on your excel spreadsheet. Select "convert and send to device" item and your file will be stored in TI calculator Application variable part.

Download CellSheet application from TI education for your TI calculator. Drag and drop this celsheet.8xk file t your TI Connect screen. Now you also have application for access the file you uploaded. Press APPS button on your computer and choose CelSheet application. Press GRAPH and ENTER and ENTER. Now choose the file that you upload and press ENTER. Now your screen should be like this:

Now you have the excel table in your graphing calculator. Make a scatter plot of the data (time, caffeine) from the table.

Selecting range: press y= and go down until A20 place. Then press GRAPH, 2, 4, ALPHA, MATH, 1, ALPHA, ., ALPHA, MATH, and 20. You have entered the range as A1:A20. Go down and press ENTER.

```
SAYF   A      B      C
16    15   1.51
17    16    1.2
18    17    .95
19    18    .76
20    19     .6
21
      [Cut[Copy]    [Menu]
```
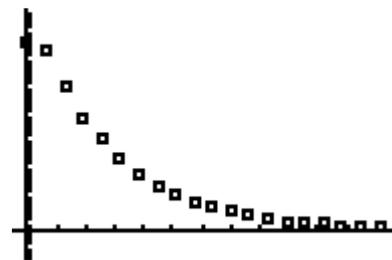
```
SELECT RANGE
Range:A1:A20
Enter
```

Press MATH, 4, 1, ALPHA, MATH, 1, ALPHA, ., ALPHA, MATH, and 20, and go down, GRAPH, 2, 4, ALPHA, ANGLE, 1, ALPHA, ., ALPHA, ANGLE, and 20. At the end press ENTER and do your scattering.

```
CELLSHEET MENU
1:File…
2:Edit…
3:Options…
4:Charts…
5:Help
6:Quit CellSheet
```

```
SCATTER CHART
XRange:A1:A20
YRange1:B1:B20
YRange2:
YRange3:■
Title:
AxesOn AxesOff
DrawFit Draw
```


1. How would you best describe the trend?

2. What is your comment about your regression? Do we need other regression types?

For the linear regression select MENU, Options, Statistics, LinReg(ax+b), ALPHA, MATH, 1, ALPHA, ., ALPHA, MATH, and 20. Go down and press ALPHA, ANGLE, 1, ALPHA, ., ALPHA, ANGLE, and 20. Go down and at the Sto Eqn To prompt, press r, and then press a to select Y-VARS. Enter two times. Now you have the results for linear regression.

3. Examine the regression equations for the graph by completing the table. In order to fill in the blanks of the table, you need to use STAT list. Therefore, enter the data to the list as column A corresponds with L1 and B corresponds with L2. To save the results in an equation, you should put Y1 to the Store RegEQ. Press STAT, go right and press 4. Now you have LinReg(ax+b). Press VARS, Y-VARS,1, and 1.

```
L1      L2      L3      3  EDIT  CALC  TESTS              LinReg(ax+b)
0       48      ▬▬▬▬       1:1-Var Stats          Xlist:L1
1       38.11              2:2-Var Stats          Ylist:L2
2       30.26              3:Med-Med              FreqList:0
3       24.03              4:LinReg(ax+b)         Store RegEQ:Y1
4       19.18              5:QuadReg              Calculate
5       15.15              6:CubicReg
6       12.03              7↓QuartReg
L3(1)=
```

Complete the table by following the directins for other regressions.

Regression	r	r^2	Formulae
Linear Regression			
Quadratic Regression			
Cubic Regression			
Quartic Regression			
Linear Regression			
Logarithmic Regression			
Exponential Regression			
Power Regression			
Sine Regression			

4. Determine the best-fit regression equation for the graph. Explain your reasoning.

5. Write down the general form of the equation for this graph in terms of constant variables such as *a, b, x* etc. explain the meaning of these constants in this equation.

6. What does "half-life" mean? What is the half-life of caffeine according to this graph?

7. When will your body have eliminated all the caffeine? Find it using the trace button.

8. What is the average decrease of the caffeine results for per hour?

9. Write a short personal reflection paragraph about your investigation, by summarizing what you have learned.

MONE Objectives: Gerçek hayat durumlarıyla ilgili bir istatistik problemini çözmek için verileri toplar, düzenler, temsil eder ve yorumlar.

Materials: TI – 83/ TI – 84 PlusTM Family and EXCEL

My Reflection

When I chose my topic, I paid attention to use a real life application and use statistical knowledge. It is also beneficial for my education and future teaching. Before preparing this worksheet, I studied statistics and searched the worksheets that we did in the class. I combined my findings with the MONE objectives.

I used a real life example, journal sample and heavy technology in this worksheet taking into consideration of MONE objectives. I downloaded a new program and application and I learned all features of this program. I aimed that students would also learn and discover the rules and explain their own reasoning with this objective. There are also open ended and journal questions; therefore, critical thinking ability and mathematical reasoning for the students' learning are also empowered.

National Council of Teachers of Mathematics (2010). Seasoning mathematics with garlic. *Mathematics Teacher, 103*(1), 58-63.