Cairo University	DS342 – Computer Languages for Modelling
Faculty of Computers and Artificial Intelligence	Assignment # 4
Department of Operations Research and Decision Support	29/5/2021

Instructions

- Save your file under "ID_yourName_Assignment#4"
- **Deadline: Monday 5/6/2021 at 11:59 p.m.**
- The assignment will not be accepted if the instructions are not followed (No Exceptions)

Format and fill your sheet as required:

Exercise # 1: In the sheet named "Financial Functions", solve the following questions:

1. Let the current interest rate for loans and savings be 10% per year. If your friend promises you to pay you 1200 $ per year for 10 years. How much is this promise worth today?

2. Now he promises to pay you $ 100 per month for 10 years. The interest rate remains at 10 % per year. How much is this promise worth today?

3. You want to take a loan of $ 10,000. The interest rate is 10 % per year. How much is the payment if you want to pay it back in equal, yearly payments over 10 years?

4. You want to take a loan of $ 10,000. The interest rate be 10 % per year. How much is the payment if you want to pay it back in equal, monthly payments over 10 years?

Exercise # 2: In the sheet named "Optimization", solve the following problem:

A big super market chain has hired an advertising firm to determine the types and amount of advertising it should invest in for its stores. The three types of advertising available are television and radio commercials and newspaper ads. The chain desires to know the number of each type of advertisement it should purchase in order to maximize exposure. It is estimated that each ad or commercial will reach the following potential audience and cost the following amount:

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	Exposure (People per Ad or Commercial)	Cost
Television commercial	20,000	$15,000
Radio commercial	12,000	$6,000
Newspaper Ad	9,000	$4,000

Given the following data:

➢ **Decision Variables**

This problem contains three decision variables, representing the represent the number of each type of advertising produced:

$x1$ = number of television commercials

$x2$ = number of radio commercials

$x3$ = number of newspaper ads

➢ **Model Constraints**

- The budget limit for advertising is $100,000.
- The television station has time available for 4 commercials.
- The radio station has time available for 10 commercials.
- The newspaper has space available for 7 ads.
- The advertising agency has time and staff available for producing no more than a total of 15 commercials and/or ads.

(Hint: Add constraint(s) that makes the decision variables integer numbers, i.e. restrict solutions to integer values)

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Exercise # 3: In the sheet named "Goal Seeking",

Alex has taken a loan with an amount of $18,000. He has been told that the loan amount will be sanctioned at an interest rate of 10% per annum for a period of 45 months, which makes the monthly repayment $481.32. When he calculated the total amount, which he will repay in 45 months, he got $21,659.47 as a result.
Now he wants to increase the repayment period (the number of months) as he will not be able to pay $481.32 per month. However, he does not want to increase the total amount of repayment by more than $25,000.
Therefore, in order to achieve this, Alex needs to go for Goal Seek.
Show the new Number of Periods, EMI "equated monthly installment", and Total Amount Repaid.

Exercise # 4: In the sheet named "Forecast",

The data includes the monthly sales of a certain product. Now, we need to predict the next year month wise sales. You are asked to predict the sales of this product for the months of: January, February, March, and April. You can use any appropriate method. Make sure to draw the scatter plot.