The University of New South Wales

ENGG1811

Computing for Engineers

Time allowed: 45 minutes
Total number of questions: **8**
Total number of marks: **40**

You are not permitted to bring any examination materials, but
OpenOffice documentation will be available during the exam.

Calculators may **not** be used
Answer **all** questions

Preparation

Download the sample exam spreadsheet:

http://www.cse.unsw.edu.au/~en1811/samples/SampleMidTerm.ods

The sample workbook has assessment buttons (*with the exception of Question 2*) so you don't have to wait for solutions to be published. The real exam workbook **will not have these buttons**.

Question 1 (5 marks)

Go to worksheet Q1. Use an IF condition to display PS in the corresponding cell in column H if a student passes the course, and FL otherwise. Please note that to pass the course, a student must score at least 50 marks in *Exam*, AND her/his *Total* mark must be greater than or equal to 50.

Write an IF condition for the first student in cell H5, and fill down the range H6:H47 to display grades for the rest of the students.

You can use the **Assess** button to check your answer if you like. However, *there won't be one in the exam spreadsheet.*

Question 2 (5 marks)

Column A of worksheet Q2 contains a data sequence with 150 numbers. Your task is to find the number of times a certain pattern occurs. We will first explain what the pattern that you are looking for is.

Given 3 consecutive data points, they can form 4 possible patterns:
- a) Increasing-increasing
- b) Increasing-decreasing
- c) Decreasing-increasing
- d) Decreasing-decreasing

These four patterns are illustrated below.
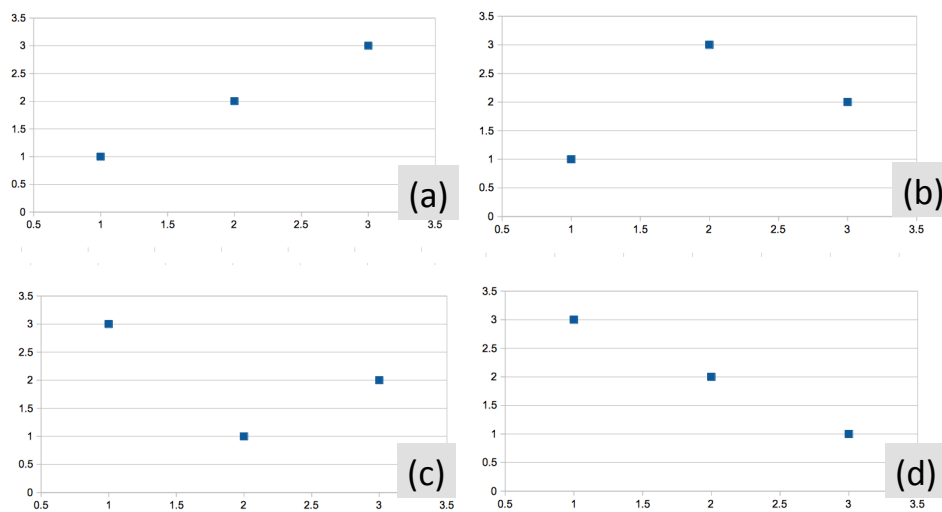
Your task for this question is to determine, in the data sequence in Column A, the number of times that **exactly** 3 consecutive data points form an increasing-increasing pattern.

Note in particular the requirement that of **exactly** 3 consecutive data points. If 4 or more consecutive data points form an increasing trend, this should **not** be counted. For example, the following patterns, where 4 and 5 data points form an increasing trend, should **not** be counted. Neither should be count 2 consecutive data points forming an increasing trend.
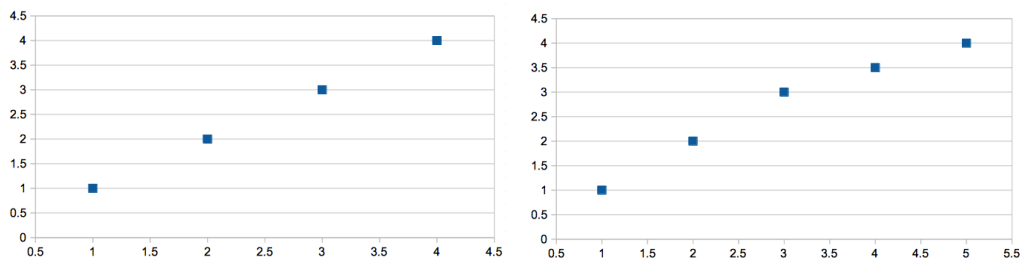
You should insert your answer in Cell D2 and provide a short explanation on how you approach the problem. Note that the pattern that you are looking for does not appear at the beginning and end of the data sequence. This makes it a bit easier because you do not need to consider what happens near the ends. You can also assume that the consecutive data points always have different values.

Question 3 (5 marks)

Now go to worksheet Q3, and using Goal Seek in OpenOffice Calc, find **three** root values for the following function. Copy each root to the boxes provided, in increasing order. The **Assess** button will confirm that you have used Goal Seek properly, and will check all three values to 3 decimal places.

$$f(x) = x^3 - 17x + 12$$

Question 4 (5 marks)

An engineering project management firm has collected a data set containing information on the last 500 completed projects that the firm has supervised. The information includes the
- Project manager
- Estimated Time (weeks)
- Actual Time (weeks)
- Estimated Cost
- Actual Cost
- Category (Commercial Construction, Residential Construction, etc)
- OnTime? - a field that reports "Delayed" if the actual time is more than 5% over the estimated time
- OnBudget? - a field that reports "Over Budget" if the actual cost is more than 2% over the estimated cost

Worksheet Q4 contains 500 rows of data, one per completed project.

Select the range A1:H501 (it has a red border) and create a pivot table. Use it to determine the answers to the following questions. Copy the values to the pink cells on the data sheet at the bottom and to the right of the data table, or carefully type them.

a) Which category had the largest *number* of **Delayed** projects, and how many of the projects were delayed?

b) Which category had the largest *percentage* of **Delayed** projects (in the corresponding category), and what percentage were delayed?

c) For how many categories did project manager **Diane Weaver** complete at least 75% of her projects (in the corresponding category) on time? Use the **Assess** button to check your values.

Question 5 (5 marks)

On worksheet Q5, using the financial function PMT and OpenOffice Calc's Goal Seek (if required), calculate the following values and enter them in the coloured cells.

a) Calculate **weekly instalment** for loan amount $10,000, loan duration 6 years, and a fixed interest rate of 6.50% per annum.

b) How much can I borrow if I can pay **$250** per **month** for **5 years**? Assume that the interest rate is fixed at 8.25% per annum.

Payments are due at the *end* of each period (PMT assumes this).

Use the **Assess** button to check your values.

Question 6 (5 marks)

Worksheet Q6 describes a hypothetical sales analysis for a factory that produces four kinds of parts, A B C and D. The spreadsheet records the production cost, selling price and profit per item for each part, and calculates the total profit when the sale quantities are entered.

These formulas are all in place.

You will need to complete the following tasks

a) Name the four (pink) quantity cells **PartA, PartB, PartC** and **PartD**.

b) Create formulas in the blue-grey cells to represent calculations used in the last three constraints in the adjacent yellow boxes. Use the names in your formulas.

c) Use the Solver tool to determine the maximum total profit subject to all seven constraints on production given in the pink box.

Use the **Assess** button to check your values.

Question 7 (5 marks)

The table on worksheet Q7 lists some experimental data recording measurements (units unspecified) of a material at different temperatures (Kelvin).

Chart the data and fit a linear trendline to it.

Fill in the table on the sheet with the four items of information requested. The first three come directly from the trendline equation and associated details, but you will have to round the answers to the specified number of significant digits. The last one is estimated from the chart after it's been adjusted.

Use the **Assess** button to check your values.

Question 8 (5 marks)

Worksheet Q8 contains a table of the daily maximum temperate at Observatory Hill in Sydney, averaged over each month between 1990 and 2012. For example, C2 is the mean of the 31 maximum temperatures for each day in January 1990.

Use Conditional Formatting to highlight the following
- Each entry that is at least 27 degrees, using a pink or reddish background
- Each entry that is less than 18 degrees, using a blue background
- The station and year cells for each year where the annual mean (column O) is more than 22.5 degrees. Do this with one rule covering A2:B24, and apply a red, bold font to the text.

The **Assess** button will only check that you've used different styles and that they have been applied to the right number of cells.