QUESTION 1

This page gives the initial instructions for the exam. Please read carefully before continuing.

- Download the answer workbook
  https://qmplus.qmul.ac.uk/mod/resource/view.php?id=1822894 You should do all your working in this workbook to answer the following questions and then when you have finished upload your final workbook.
- When asked to give a numerical answer please give your answer accurate to at least 3dp unless otherwise specified. Copying and pasting from Excel is encouraged.
- When asked to give a formula you are encouraged to copy and paste it from the formula bar of your spreadsheet.
- Please enter the version of Excel that you are using here [   ] and

  whether you are using [▾]

In this question you are going to use Excel to evaluate four mathematical functions f, g, h, j which are defined below.

- Move to the worksheet 'Q1'. You will see that I have entered the headings $x, f(x), g(x), h(x), j(x)$ for you.
- Enter the numbers $1, 1.1, 1.2, \ldots 3$ into the cells A2 to A22. You will evaluate each of the four functions at these values of x.
- The function f is defined by $f(x) = \cos(x)$. Using Autofill, enter formulas in cells B2 to B22 that calculate $f(x)$ (i.e., f at the corresponding value in column A).

  Enter the number in cell B18 here: [   ] and the formula in cell B18

  here: [   ] .

- The function g is defined by $g(x) = \exp(x^2 + 1)$. Using Autofill, enter formulas in cells C2 to C22 that calculate $g(x)$. Enter the number in cell C11 here:

  [   ] and the formula in cell C11 here: [   ] .

- The function h is defined by $h(x) = \frac{2x-1}{x+2}$. Using Autofill, enter formulas in cells D2 to D22 that calculate $h(x)$. Enter the number in cell D12 here: [   ] and

  the formula in cell D12 here: [   ] .

- The function j is defined by $j(x) = \sin(4 + \sqrt{x})$. Using Autofill, enter formulas in cells E2 to E22 that calculate $j(x)$. Enter the number in cell E19 here:

  [   ] and the formula in cell E19 here: [   ] .

- Switch to worksheet 'Q2'. You will see it already has data in it.
  - In column A it lists various staff members of a company.
  - In column B it lists which town they work in.
  - Column C lists the staff member's sales (in thousands of pounds) in 2018.
  - Column D lists the staff member's sales (in thousands of pounds) in 2019.
  - Column E lists the staff member's sales (in thousands of pounds) in 2020.
- Using Sorting and Filtering answer the following questions:
- Who sold the most in 2019?

- How many people work in Bolton?

- Of the people working in London, which person sold the least in 2020?

- Of the people whose name start with the letter A, which person sold the most in 2018?

- Move to the worksheet 'Q3'. You will see that it is partially filled in.
- You invest 4000 pounds in a bank at the start of 2021. Enter 4000 in cell B2.
- On the last day of the year the bank pays you interest at a fixed rate. The interest is added to your account balance.
- The interest rate of 4% is in cell E1.
- Enter a formula in cell B3 that calculates the account balance that you have at the start of the year shown in cell A3. Your formula must refer to the cell E1 and be written in such a way that when you AutoFill it down column B it calculates the account balance correctly for each year.
- After having done this AutoFill, enter the value (to the nearest pound) in Cell B10 here: [   ] and the formula in Cell B10 here:

  [   ]

- Change the interest rate in cell E1 to 6%. What is the account balance (to the nearest pound) at the start of 2028? [   ]

QUESTION 5

- Move to the (empty) worksheet 'Q4'. This question will be about the Newton-Raphson Method. The template worksheet for the Newton-Raphson method is available at the end of the workbook (in a worksheet called 'Newton-Raphson Template'). You may use this template if you wish.
- Using initial guess of $x_1 = 1$ find a root of the equation (accurate to 6dp) of $3\cos x - x = 0$. Enter the root here: [　　　　]
- Change the initial guess to $x_1 = -1$. What root do you find this time (again give your answer to 6dp)? [　　　　]

QUESTION 6

- Move to the (empty) worksheet 'Q5'. Use Excel to solve the simultaneous equations:

$$x - y + z = 2$$

$$y + 2z = 6$$

$$x + y + z = 8$$

- The value of x is [　　　　]
- In your worksheet you used two matrix functions. Enter them below. You do not need to enter the full formulas just the function names. The first matrix function used is [　　　　] The second matrix function used is [　　　　]

QUESTION 7

- Switch to worksheet 'Q6'. You will see it already has data in it.
  - In column A it lists various staff members of a company.
  - In column B it lists which town they work in.
  - Column C is currently blank (except for the header 2018).
  - Column D lists the persons sales (in thousands of pounds) in 2019.
  - Column E lists the persons sales (in thousands of pounds) in 2020.
- Enter 'Total Sales 2019' in Cell J1. Enter a formula in cell K1 that calculates the total sales from all staff members in 2019. Enter the total sales in 2019 (in thousands of pounds) here [   ] and enter the formula you used here

  [   ]

- Enter 'Number of Staff in Norwich in cell J2. Enter a formula in cell K2 that counts the number of staff working in Norwich. Enter the number of staff here: [   ]

  and enter the formula you used here [   ]

- Enter 'Total Sales London 2020' in cell J3. Enter a formula in cell K3 that calculates the total sales in 2020 from staff working in London. Enter the value of sales here (in thousands of pounds): [   ] and enter the formula you used

  here [   ]

Continued on next page.

- In cell F1 enter '2020 better than 2019'. In cell F2 enter a formula that outputs 'Yes' if the staff member in this row sold (strictly) more in 2020 than in 2019 and otherwise outputs 'No'. Autofill your formula down column F. Enter the formula from cell F47 here [   ]

- The information about these staff members' sales in 2018 is in the next worksheet called 'Sales 2018'. If you switch to that worksheet you will see that column A has the staff members listed in alphabetical order and column B has their sales in 2018. Switch back the the Q6 sheet.
- Using vlookup write a formula in cell C2 which looks up this row's staff member's 2018 sales from the 'Sales 2018' worksheet. Autofill this formula down column C. Enter the formula from cell C90 here:
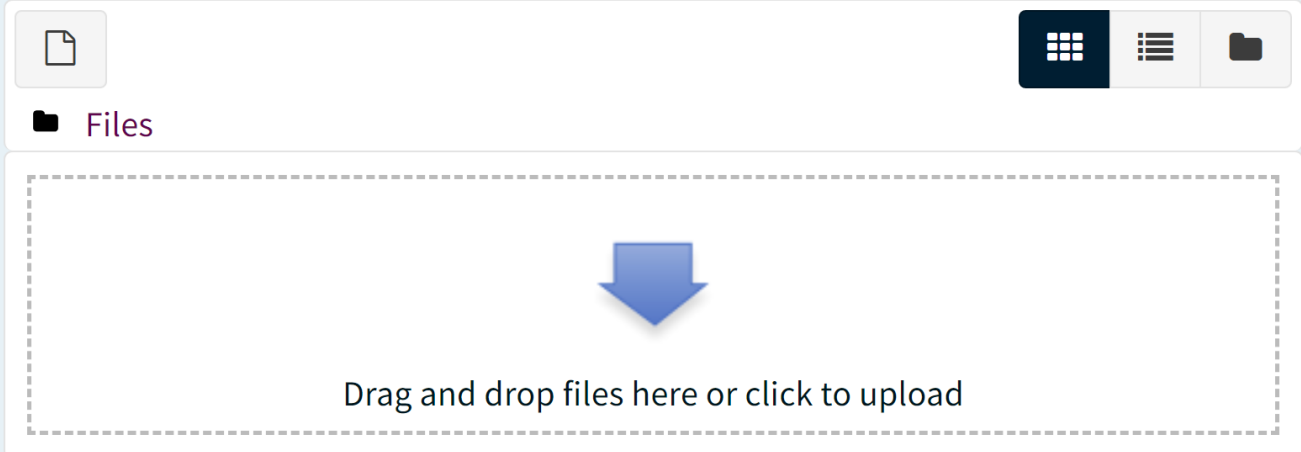
  [   ]

- In cell G1 enter '2020 worst year'. In cell G2 enter a formula that outputs 'Yes' if the year in which that staff member had their lowest sales was 2020, and ouputs 'No' otherwise. Autofill your formula down column G. Enter the formula from cell G78 here: [   ]

QUESTION 8

Please upload your completed workbook here.

Maximum file size: 50MB, maximum number of files: 1

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■ **Files**

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Drag and drop files here or click to upload

Accepted file types

Excel 2007 macro-enabled workbook .xlsm

Excel 2007 spreadsheet .xlsx

Excel spreadsheet .xls