GROUP COURSE WORK

GROUPWORK QUESTION PAPER: **Spring 2019**

Module Code:	**MA4001NI**
Module Title:	**Logic and Problem Solving**
Module Leader:	**Ashok Dhungana** (Islington College)

Coursework Type:	**Group**
Coursework Weight:	This coursework accounts for **50%** of your total module marks.
Submission Date:	**19th August 2019**
When Coursework is given out:	**2nd August 2019**
Submission Instructions:	Upload the group coursework in the Google classroom of Islington College before the due date:
Warning:	London Metropolitan University and Islington College takes Plagiarism seriously. Offenders will be dealt with sternly.

Plagiarism Notice

You are reminded that there exist regulations concerning plagiarism.

Extracts from University Regulations on Cheating, Plagiarism and Collusion

Section 2.3: “The following broad types of offence can be identified and are provided as indicative examples …..

(i) Cheating: including copying coursework.
(ii) Falsifying data in experimental results.
(iii) Personation, where a substitute takes an examination or test on behalf of the candidate. Both candidate and substitute may be guilty of an offence under these Regulations.
(iv) Bribery or attempted bribery of a person thought to have some influence on the candidate’s assessment.
(v) Collusion to present joint work as the work solely of one individual.
(vi) Plagiarism, where the work or ideas of another are presented as the candidate’s own.
(vii) Other conduct calculated to secure an advantage on assessment.
(viii) Assisting in any of the above.

Some notes on what this means for students:

(i) Copying another student's work is an offence, whether from a copy on paper or from a computer file, and in whatever form the intellectual property being copied takes, including text, mathematical notation and computer programs.
(ii) Taking extracts from published sources without attribution is an offence. To quote ideas, sometimes using extracts, is generally to be encouraged. Quoting ideas is achieved by stating an author's argument and attributing it, perhaps by quoting, immediately in the text, his or her name and year of publication, e.g. " e = mc2 (Einstein 1905)". A reference section at the end of your work should then list all such references in alphabetical order of authors' surnames. (There are variations on this referencing system which your tutors may prefer you to use.) If you wish to quote a paragraph or so from published work then indent the quotation on both left and right margins, using an italic font where practicable, and introduce the quotation with an attribution.

Further information in relation to the existing London Metropolitan University regulations concerning plagiarism can be obtained from http://www.londonmet.ac.uk/academic-regulations

MA4001NI: Logic and Problem Solving Spring 2019

GROUP COURSEWORK Problem 1, 2 & 3

Problem 1

Write a procedure, **tax,** to calculate (to the nearest pound) the tax a person owes, depending on his/her income.
Calculate the tax using this table:

Income Tax rates	
Tax rate	**Taxable income**
Basic rate 15%	£0 to £10,0000
Higher rate 30%	£10,0000 to £350,000
Additional rate 40%	Over £350,000

The procedure should show

i) The salary,
ii) The tax rate,
iii) The amount of tax
iv) The amount left after tax and
v) Be able to deal with any input, valid or not.

Your tests of your procedure should include the following values, which should be included in your final presentation.

tax (37000),
tax (174530),
tax (279000),
tax (43550),
tax (15330),
tax (-130000),

Problem 2

Part A

Jack and Bro's company ltd. makes three types of decorative lamps; Model A, model B and model C .The raw material requirement for all lamps is the same, but the cost of production differs due to different labour requirements. Each model A lamp requires 0.1 hour of assembly time, 0.2 hour of wiring time and 0.1 hour of packaging time. Model B lamp requires 0.2 hour of assembly time, 0.3 hour of wiring time and 0.1 hour of packaging time. Model C lamp requires 0.3 hour of assembly time, 0.4 hour of wiring time and 0.1 hour of packaging time. The Company makes a profit of £120 on each model A lamp , £190 on each model B lamp and £210 on each model C lamp .The company can schedule up to 80 hours of assembly labour ,120 hours of wiring labour and 100 hours of packaging labour.

Questions

You should answer the following questions and incorporate your answers into a word-processed report to form part of your final pdf. The sections of your report should correspond to the individual questions following.

a) Formulate the problem as a linear programming model, clearly defining the variables, the objective function and the constraints.

b) Solve the problem using Simplex method and find the optimum quantity of each model so that the company can make maximum profit .

c) Solve the problem using the Excel Solver and interpret the results.

d) For the final part of your report, in your capacity as an Adviser, you should present a memorandum to the Jack and Bro's company. Describe your main conclusions in simple, non-technical English; i.e. do not use technical terms like variable, objective function or dual price. Don't worry about repeating some or all of the points that you have already made in answer to earlier questions. The aim is to communicate your conclusions clearly to someone who is knowledgeable about the combination of products to maximize the profit, but who knows nothing about the subject of linear programming. You may use tables and charts if you wish.

Part B

A factory uses three different resources for the manufacture of two different products, 20 units of resource A, 12 units of resource B and 16 units of C being available. One unit of first product requires 2, 2 and 4 units of the respective resources and 1 unit of the second product requires 4, 2 and 0 units of the respective resources. It is known that the first product gives a profit of £ 20 per unit and the second £30 per unit. Formulate the linear programming problem to find the number of units of each product that should be manufactured for maximizing the profit.

Solve it graphically.

Problem 3

The monthly revenue R achieved by selling x items is figured to be
$R(x) = 13x - 0.1x^2$. The monthly cost of selling x items is $C(x) = 4x + 60$.

Questions

You should answer the following questions and incorporate your answers into a word-processed report. The sections of your report should correspond to the individual questions below.

a) Find the breakeven point(s).

b) By plotting the revenue and cost functions, obtain the Break-even output levels and corresponding price (use graph paper or graphical tools).

c) Generate the profit function for the company and find,
   i. The level production that maximizes the profit.

   ii. The maximum profit.

Presentation of the documentation

Note: This work is to be completed by the group. All stages of the work: the problem formulation, Excel spreadsheet work, interpretation and documentation should be shared. The documentation must include a log of meetings and this should indicate that all students have taken part at each stage. If the group does not agree that a particular member(s) of the group should have the same mark as the rest of the group, all group members need to complete the confidential peer assessment form and email this form to Ashok Dhungana (ashok.dhungana@islingtoncollege.edu.np).

Files must be uploaded to Google classroom by the deadline:
A single .pdf of all three questions with their answers, the group's log, and a cover sheet which must show the group's name, the students' names and their ID saved with the appropriate file name. All questions and their answers must be distinguishable.

-END-