B.E. International Program

Faculty of Economics, Thammasat University

Midterm Examination: 1/2014

Subject: MA 217 Calculus for Social Science 2

Date: Saturday 11 October 2014 Time: 09.30 – 11.30 hrs.

Seat No…………………..

ID.No……………………

INSTRUCTIONS

DO NOT TURN OVER UNTIL TOLD THAT YOU MAY DO SO.

*This paper has **FOUR** questions. Candidates are to answer **ALL** questions. Show all the steps in answering the questions. Simplify your answers where possible. The mark for each question is given next to the problem – **use your time wisely**.* Total marks are **50 marks**.

Students:

1. Non-graphic scientific calculators are allowed. Textbooks, lecture notes or any reading materials are **NOT** allowed in the examination room. If you are caught doing so you will automatically receive an **"F"** for the course and be suspended for one academic year.

2. All communication equipment (mobile phones, pagers, etc.) **must be switched off**.

3. Write in **black or blue ink only**. Any writing in pencil will **NOT** be marked except for curve sketching.

4. **All of the Thammasat University examination rules are applied.**

Question (Marks)	**1** (21)	**2** (6)	**3** (6)	**4** (15)	**Total** (50)
Score					

1. For a function $f(x,y,z)=2xy+2yz+xz$ (21 marks)

   subject to $xyz=C$ where $x,y,z>\mathbf{0}$ and C is a constant

   (a) Given that $C=108$, use the **substitution method** to calculate any possible critical point(s). In addition, use the second derivative test to classify the critical point(s).

   (b) Use the **Lagrange Multiplier method** to determine any possible critical point(s) and optimum value of the function **in term of *C* only**.

   (c) Form (b), determine the value of *C*, which gives the optimum value of the function $f^{*}(x^{*},y^{*},z^{*})=108$, and identify the corresponding critical point.

   (d) From (b) and (c), if the constant *C* in the constraint equation decreases by 0.4, estimate the new optimum value of the function.

2. Use the **Extreme Value theorem** to optimise (6 marks)

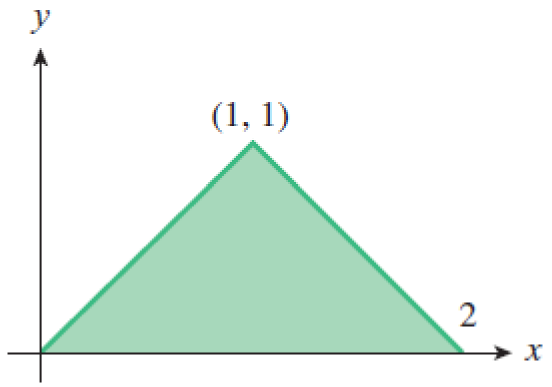
   the function $$f(x,y)=e^{-\left(x^2+y^2\right)}$$

   subject to the constraint $x^2+4y^2\le 4$.

3. Use the **Extreme Value theorem** to optimise (6 marks)

   the function $f(x,y)=x^3+y^3$

   subject to the constraints as shown below.



4. ~~Use information from Question 3 if possible and~~ Optimise (17 marks)

   the function $f(x,y)=-(x-4)^2-(y-4)^2$

   subject to the constraint $x+y\le 4$ and $x+3y\le 9$.