MATH 2130 Section A01 Summer 2011 Term Test 2

You have 70 min to solve 5 problems. Please note

- **Write your name/student id clearly**
- **Illegible work will have marks removed. If I have trouble reading your work, it will not be marked.**
- **Write only on one side of the paper in the space design for it. If you require more space, CLEARLY indicate that you are continuing on the back.**
- **The last page of the exam is for calculations or scrap work. You may remove it, but be careful not to remove the staple. This page will NOT be marked.**
- **No calculators or any outside materials other than a pencil are permitted.**
- **The examination is out of 40 marks. Question values are given in brackets beside each question.**
- **You must show your work unless otherwise indicated.**

Good luck!

Surname: _____

Given Name: _____

Student ID: _____

1. Given that

$$xyu + v = 2 \text{ and } y^2 + u^2 - u^2v = y + 43$$

define u and v as functions of x and y, find $\frac{\partial u}{\partial y}\big)_x$ when $x = 1, y = 2, u = 3$ and $v = -4$. [5]

2. Find the equation of the tangent line (in either parametric, vector or symmetric form) to the curve of intersection of

$$yz + \sin(xyz) = -4 \text{ and } x^2 + y^2 + z^2 = 8$$

at the point $(0, 2, -2)$. [7]

3. For the function $f(x, y) = x^2y + xy^2 + 3y$

   (a) Find the critical point(s) of f. [4]

   (b) Classify the critical point(s) found in (a) as either relative minimum, relative maximum, saddle point, or neither. [5]

(c) Find the absolute maximum and minimum of f on the region bounded by $y = x^2$ and $y = 4$. [7]

4. Find

$$\iint_R (1-x)dA$$

where R is the region bounded by the lines $x+y=1, x+y=-1, x-y=1, x-y=-1$. [8]

5. The one-dimensional wave equation is

$$\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$$

where c is any positive constant. Let $f(u)$ and $g(v)$ be twice differentiable functions. Show that

$$y(x,t) = f(x+ct) + g(x-ct)$$

satisfies the wave equation. [4]

THIS PAGE IS FOR SCRAP WORK.