# MAT201 Test 2

January 8, 2020.

Name: _____ Matric No.:_____

Answer all questions.

1. (a) Use implicit differentiation to find $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$ for the function $yz = \ln(x + z)$.

   (b) Find the direction $\mathbf{u}$ in which the function $f(x, y) = e^{(x-y)}$ increases fastest at $P = (1, 2)$. How fast is $f$ increasing?

Total: 13 marks

2. (a) i. Find $x$ and $y$ to minimize the error $E = (x+y)^2 + (x+2y-5)^2 + (x+3y-4)^2$.

   ii. Prove that your answer in (i) is a minimum point and not a maximum or a saddle point.

   (b) Determine the minimum of $f(x,y,z) = x^2+2y^2+z^2$ if $(x,y,z)$ is restricted to the planes $g(x,y,z) = x+y+z = 0$ and $h(x,y,z) = x-z = 1$.

Total: 27 marks