

**MATH 2010B Advanced Calculus I, 2014-15**  
**QUIZ 2**

**Honesty in Academic Work:** *The Chinese University of Hong Kong places very high importance on honesty in academic work submitted by students, and adopts a policy of zero tolerance on cheating and plagiarism. Any related offence will lead to disciplinary action including termination of studies at the University.*

NAME: \_\_\_\_\_

ID: \_\_\_\_\_

**Instruction:** Answer ALL TWO questions and show your work with explanation.

**Question 1:** Let  $f : \mathbb{R}^3 \rightarrow \mathbb{R}$  be the function defined by

$$f(x, y, z) = xz + y^2.$$

- (a) (6 points) Describe the level surface  $L_0 := \{f(x, y, z) = 0\}$ . Is it a cylinder, an ellipsoid, a paraboloid, a hyperboloid or a cone? Find a change of coordinates to put it in standard form: i.e.  $Au^2 + Bv^2 + Cw^2 + Du + Ev + Fw + G = 0$ .

**Answer:**

- (b) (8 points) Find the intersection of  $L_0$  with the plane  $z = x + y + 1$ . Is it an ellipse, hyperbola or parabola? Explain clearly your answer.

**Answer:**

(continued)

**Question 2:** (6 points) Evaluate the following limit or explain why the limit does not exist:

$$\lim_{(x,y) \rightarrow (0,0)} \frac{|y|}{\sqrt{x^2 + y^2}}.$$

**Answer:**

—End of Quiz 2—