

# Ans. key

## Math 2551 A1-3 Exercise 14

Section:

Name:

Student Number:

Let  $f(x, y)$  be a differentiable function and  $\nabla f \neq \mathbf{0}$ .  
Mark "true" or "false" for each of the following statements.

True

(1)  $(f_x, f_y, -1)$  gives a normal direction of the surface  $z = f(x, y)$ . The surface can be reformulated as a level surface  $F(x, y, z) \stackrel{\text{def}}{=} f(x, y) - z = 0$ ,

$$\nabla F = (f_x, f_y, -1)$$

True

(2)  $(f_x, f_y, -1 + 0.5 \cos z)$  gives a normal direction of the surface  $z = f(x, y) + 0.5 \sin z$ .

The surface can be reformulated as a level surface

$$F(x, y, z) \stackrel{\text{def}}{=} f(x, y) + 0.5 \sin z - z = 0$$

$$\nabla F = (f_x, f_y, -1 + 0.5 \cos z)$$