

# Quiz 3

April 21, 2023

Name: \_\_\_\_\_

Student No.: \_\_\_\_\_

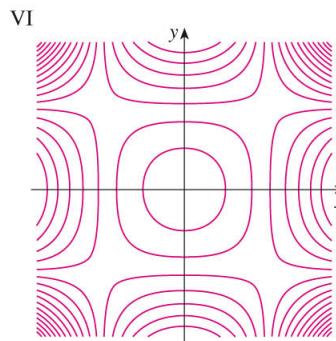
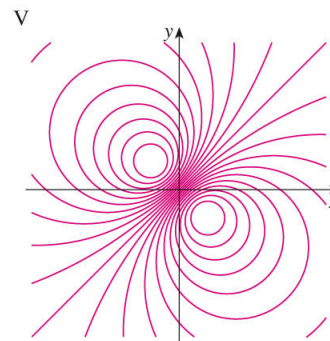
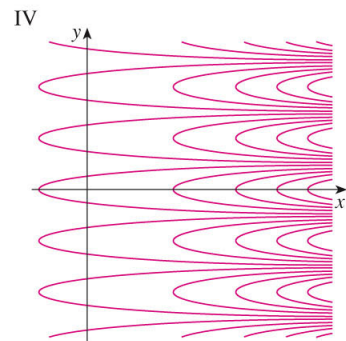
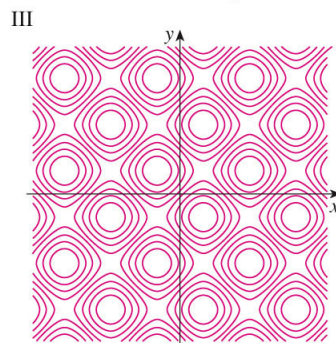
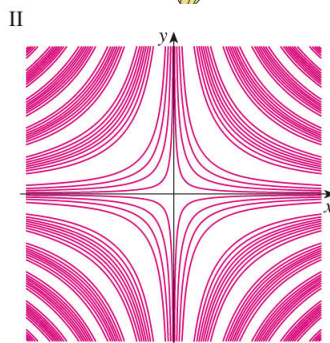
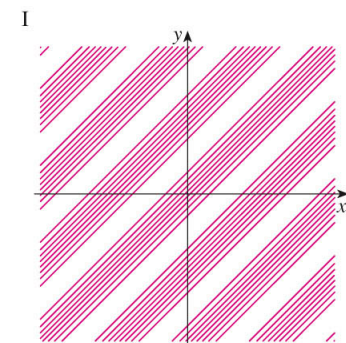
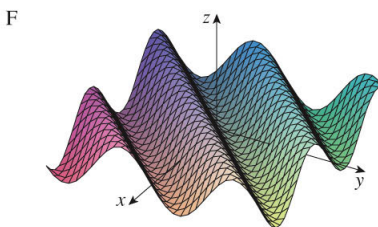
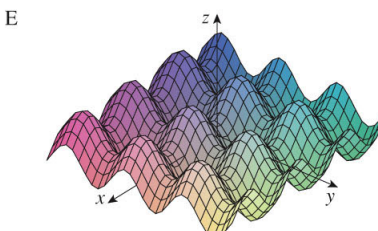
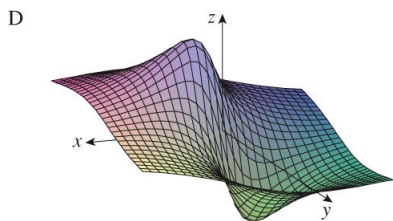
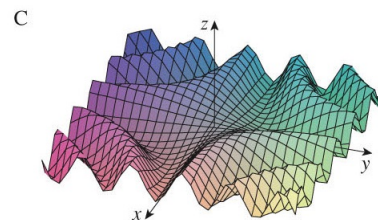
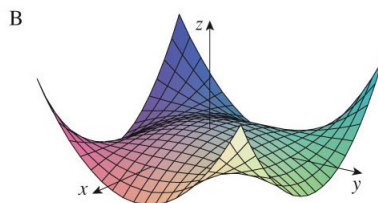
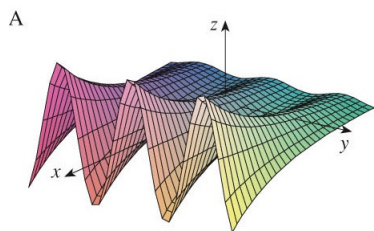
1. (40 %) Let  $f(x, y) = \begin{cases} 0 & \text{if } y \leq 0 \text{ or } y \geq x^8, \\ 1 & \text{if } 0 < y < x^8. \end{cases}$

- (a) Prove that  $f$  is discontinuous at  $(0, 0)$ .  
 (b) Prove that  $f$  is discontinuous on two entire curves.

2. (40 %) Partial Derivatives

- (a) Find the first partial derivatives of the function  $u(r, \theta) = \cos(r \sin \theta)$ .  
 (b) Given  $v(x, y, z) = xy^2z^4 + \arctan(x + \sqrt{z})$ . Find  $v_{xyz}$ .

3. (20 %) Match the given function with its graph (labeled A–F) and contour map (labeled I–VI). Give reasons for your choices.



- (a)  $z = e^x \cos y$ .  
 (b)  $z = \sin(x - y)$ .