

MAC 2313 (Multivariable Calculus) — *Answers*  
 QUIZ 5, Friday September 23, 2016

Name:

PID:

Remember that no documents or calculators, or any other electronic devices are allowed during the quiz. Also remember that you won't get any credit(s) if you do not show the steps to your answers.

1. [1] Describe in words the domain of the function  $g(x, y, z) = \frac{\sin(xyz)}{z^2 - x^2 - y^2}$ .

$$D_g = \{(x, y, z); z^2 - x^2 - y^2 \neq 0\}$$

= all points in 3-space except points on the cone  $z^2 = x^2 + y^2$

2. [5] Let  $f(x, y, z) = x^3 y^2 e^{z^2 x}$ . a) Evaluate:  $f(-2, 1, 2) = -8e^{-8}$       b)  $f(y, z, 2x) = y^3 z^2 e^{4x^2 y}$

c) Find each partial derivative

$$f_x(x, y, z) = 3x^2 y^2 e^{z^2 x} + x^3 y^2 z^2 e^{z^2 x}$$

$$f_y(x, y, z) = 2x^3 y e^{z^2 x}$$

$$f_z(x, y, z) = 2x^4 y^2 z e^{z^2 x}$$

3. [4] Evaluate each limit

a)  $\lim_{(x,y) \rightarrow (-1,1)} \frac{xy}{x^2 + y^2} = \frac{-1(1)}{1+1} = -\frac{1}{2}$

b)  $\lim_{(x,y,z) \rightarrow (1,2,1)} \frac{xy - 2x^2 z}{y^2 - 4x^2 z^2} = \lim_{(x,y,z) \rightarrow (1,2,1)} \frac{x(y-2xz)}{(y-2xz)(y+2xz)} = \lim_{(x,y,z) \rightarrow (1,2,1)} \frac{x}{y+2xz}$

$$= \frac{1}{2+2}$$

$$= \frac{1}{4}$$