

# Quiz 5

MATH 32A-3, CALCULUS OF SEVERAL VARIABLES, FALL 2016

SECTION: 3A 3B **3C** 3D 3E 3F (CIRCLE ONE)

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You have 10 minutes to solve the following problems. Show all of your work. To receive full credit, your answer must be neatly written and logically organized.

**Problem 1.** (5 points) Find the linearization  $L(x, y)$  of  $f(x, y) = x^2y + xy^3$  at the point  $(2, 1)$ .

$$f(x, y) = x^2y + xy^3$$

$$f(2, 1) = 4(1) + 2(1)^3 = 6$$

$$f_x(x, y) = 2xy + y^3$$

$$f_x(2, 1) = 2(2)(1) + (1)^3 = 5$$

$$f_y(x, y) = x^2 + 3xy^2$$

$$f_y(2, 1) = 2^2 + 3(2)(1)^2 = 10$$

$$L(2, 1) = f(2, 1) + f_x(2, 1)(x-2) + f_y(2, 1)(y-1)$$

$$= 6 + 5(x-2) + 10(y-1)$$

$$= 6 + 5x - 10 + 10y - 10$$

$$= 5x + 10y - 14$$

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**Problem 2.** (5 points.) Use the linear approximation of the function  $f(x, y) = x^3y^2$  to estimate  $(2.01)^3(1.02)^2$ .

$$\text{let } (x, y) = (2, 1)$$

$$f(x, y) = x^3y^2$$

$$f(2, 1) = 2^3(1^2) = 8$$

$$f_x(x, y) = 3x^2y^2$$

$$f_x(2, 1) = 3(2^2)(1^2) = 12$$

$$f_y(x, y) = 2x^3y$$

$$f_y(2, 1) = 2(2^3)(1) = 16$$

$$2 \times 8 + 12(\Delta x) + 16(\Delta y)$$

$$(2.01)^3(1.02)^2 \approx 8 + 12(0.01) + 16(0.02)$$

$$\approx 8 + 0.12 + 0.32$$

$$\approx 8 + 0.44$$

$$\approx 8.44 //$$