

**QUIZ 16 SOLUTIONS: LESSON 20**  
**MARCH 6, 2019**

Write legibly, clearly indicate the question you are answering, and put a box or circle around your final answer. If you do not clearly indicate the question numbers, I will take off points. Write as much work as you need to demonstrate to me that you understand the concepts involved. If you have any questions, raise your hand and I will come over to you.

1. [5 pts] Find the second order partial derivatives of

$$f(x, y) = 10x^3y^2 + 7y^5.$$

$$f_x = \frac{\partial}{\partial x} (10x^3y^2 + 7y^5)$$

$$= 30x^2y^2$$

$$f_y = \frac{\partial}{\partial y} (10x^3y^2 + 7y^5)$$

$$= 20x^3y + 35y^4$$

$$f_{xx} = \frac{\partial}{\partial x} (30x^2y^2)$$

$$= 60xy^2$$

$$f_{yy} = \frac{\partial}{\partial y} (20x^3y + 35y^4)$$

$$= 20x^3 + 140y^3$$

$$f_{xy} = \frac{\partial}{\partial y} (30x^2y^2)$$

$$= 60x^2y$$

$$f_{xx} = \boxed{60xy^2}$$

$$f_{xy} = \boxed{60x^2y}$$

$$f_{yy} = \boxed{20x^3 + 140y^3}$$

2. [5 pts] Find  $f_{xy}$  given

$$f(x, y) = 10ye^{\cos(5x-3)}.$$

$$f_{xy} = f_{yx}$$

$$f_y = \frac{\partial}{\partial y} (10ye^{\cos(5x-3)})$$

$$= 10e^{\cos(5x-3)} \frac{\partial}{\partial y} (y)$$

$$= 10e^{\cos(5x-3)}$$

$$f_{yx} = \frac{\partial}{\partial x} (10e^{\cos(5x-3)})$$

$$= 10 \left[ \frac{\partial}{\partial x} (\cos(5x-3)) \right] e^{\cos(5x-3)}$$

$$= 10 \left[ (5)(-\sin(5x-3)) \right] e^{\cos(5x-3)}$$

$$= \boxed{-50 \sin(5x-3) e^{\cos(5x-3)}}$$