

The solutions for this quiz **MUST** be submitted in gradescope by 11:55pm on Thursday, February 15, 2024.

You will be graded on both the correct answer and the correctness of the work that you provide to justify that answer. I expect to see all of your work in a neat and orderly manner.

You are allowed to use your class notes and a calculator when working the quiz. However, I would suggest trying to do quiz without using any other resources to see if you actually know the material. You are not allowed to ask other people for help with the questions. If you need clarification on a question, send me an e-mail or ask me in person.

You do not need to turn in this cover sheet when you submit your work. You are expected to tell webassign where on what pages your questions are located.

I would suggest setting an alarm on your phone so that you do not forget to submit the quiz. You can submit multiple times to gradescope. Only the last submission is graded.

1. (2 points) Give the domain of  $f(x, y) = \frac{\ln(x-2)}{\sqrt{x-y^2}}$ .
2. (2 points) Compute  $f_{xx}$  for  $f(x, y) = \sin(x^2 - y^3)$
3. (2 points) Compute  $f_{xyx}$  for  $f(x, y) = x^4y^2 - x^3y$
4. (2 points) Find the total differential of the function  $T = x^4e^{xy} + y^2$
5. (2 points) Find the tangent plane for  $f(x, y) = 2x^3 + 5y^2 + 3xy$  at the point  $(1, 2, 28)$ .

## Quiz 3 Key

$$1) D = \{(x, y) \mid x-2 > 0 \text{ and } x-y^2 > 0\}$$

$$\text{or } D = \{(x, y) \mid x > 2 \text{ and } x > y^2\}$$

$$2) f_x = 2x \cos(x^2 - y^3)$$

$$\begin{aligned} f_{xx} &= 2 \cos(x^2 - y^3) - 2x \sin(x^2 - y^3) \cdot 2x \\ &= 2 \cos(x^2 - y^3) - 4x^2 \sin(x^2 - y^3) \end{aligned}$$

$$3) f_x = 4x^3 y^2 - 3x^2 y$$

$$f_{xy} = 8x^3 y - 3x^2$$

$$f_{xyx} = 24x^2 y - 6x$$

$$4) dT = T_x dx + T_y dy$$

$$= (4x^3 e^{xy} + x^4 \cdot y e^{xy}) dx + (x^5 e^{xy} + 2y) dy$$

5]

$$f_x = 6x^2 + 3y$$

$$f_y = 10y + 3x$$

$$\begin{aligned} f_x(1,2) &= 6(1)^2 + 3(2) \\ &= 6 + 6 \\ &= 12 \end{aligned}$$

$$\begin{aligned} f_y(1,2) &= 10(2) + 3(1) \\ &= 20 + 3 \\ &= 23 \end{aligned}$$

$$n = \langle f_x, f_y, -1 \rangle$$

$$= \langle 12, 23, -1 \rangle$$

$$12(x-1) + 23(y-2) - 1(z-28) = 0$$