

# Calculus on 3D Functions

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

1. Find  $\frac{\partial}{\partial x} f(x, y)$  for the following:

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

$$f(x, y) = \frac{2y}{y + \cos(x)}$$

$$f(x, y) = x \sin(xy)$$

2. Let  $f(x, y) = xe^{yx^2}$ .

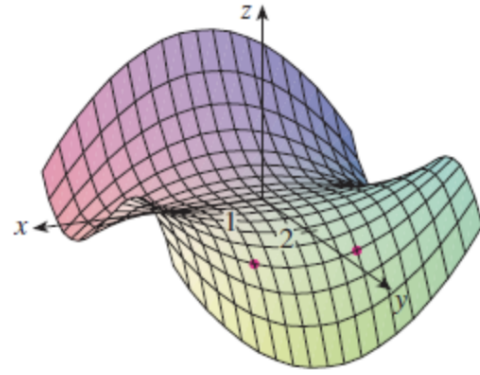
(a) Compute  $\frac{\partial}{\partial x} f(x, y)|_{(0,0)}$ .

(b) Compute  $f_y(0, 0)$

(c) Graph  $f(x, y)$  and “find”  $f_y(0, 0)$  on the graph.

3. Consider the surface graphed below.

- (a) Is  $f_x(1, 2) > 0$  or  $f_x(1, 2) < 0$ ?  
Justify your answer.
- (b) Is  $D_y(1, 2)$  positive or negative?



4. Let  $f(x, y) = xe^{yx^2}$ . Find an equation of a line tangent to  $f$  at  $(0, 0)$ .

5. Let  $f(x, y) = 3xy^2 - 2y + 5x^2y^2$ .

(a) Find  $f_{xy}(-1, 2)$ .

(b) Find  $f_{yx}(-1, 2)$ .