

Math 2143 - Brief Calculus with Applications

Written Assignment 8 - Due 2016.07.29

Directions: Please answer the following question in complete sentences. Be sure to label all geometric objects in any illustrations (if any). I will accept an answer in a scanned image format, as a pdf, or as a picture taken and sent from your awesome smart phone.

Question: Long ago, we learned that given a function $y = f(x)$, if $x = x_0$ is in the domain of f , then the tangent line to $f(x)$ at $x = x_0$ is given by

$$L(x) = f'(x_0)(x - x_0) + f(x_0)$$

We have now encountered functions of multiple variables. Instead of a tangent line, we can also have a tangent plane for functions $z = f(x, y)$. First, find a formula for a tangent plane $P(x, y)$ to a surface $z = f(x, y)$, be sure to explain in detail what you are doing and how you arrived at the formula.

Next, use the tangent plane formula to compute the tangent plane to the surface $z = 3x^2 + 2xy + 2y^2 + 4x - 2y + 2$ at $(x_0, y_0) = (1, -1)$.