

Assignment #17

Due on Wednesday, April 24, 2019

Read Chapter 6, on *Linear Functions and Linear Approximations*, in the class lecture notes at <http://pages.pomona.edu/~ajr04747/>

Do the following problems

1. The expression $f(x, y) = 2 - \sqrt{4 - x^2 - y^2}$ defines a function of two variables
 - (a) Give the domain of f .
 - (b) Sketch a few of the contour curves: $f(x, y) = c$; indicate values of values c for which contour curves exist.
 - (c) Sketch the graph of f .
2. Let $f: \mathbb{R}^2 \rightarrow \mathbb{R}$ be defined by $f(x, y) = 4 - x^2 - y^2$, for all $(x, y) \in \mathbb{R}^2$.
 - (a) Give the domain of f .
 - (b) Sketch a few of the contour curves of the graph of f .
 - (c) Sketch the graph of $z = f(x, y)$.
3. Let $f: \mathbb{R}^2 \rightarrow \mathbb{R}$ be defined by $f(x, y) = 4 - 3x - 2y$, for all $(x, y) \in \mathbb{R}^2$.
 - (a) Give the domain of f .
 - (b) Sketch a few of the contour curves of the graph of f .
 - (c) Sketch the graph of $z = f(x, y)$.
4. Suppose that f is a linear function of x and y that has slope 2 in the x direction and slope 3 in the y -direction.
 - (a) Determine the change in $z = f(x, y)$ that a change of 0.5 in x and a change of -0.4 in y produces.
 - (b) If $f(5, 7) = 2$, determine the value of $z = f(x, y)$ when $x = 4.9$ and $y = 7.2$.
5. The graph of a linear function f is a plane passing through the point $(4, 3, -2)$ in three-dimensional space \mathbb{R}^3 , and having slope 5 in the x -direction and slope -3 in the y -direction.
 - (a) Determine a formula for computing $f(x, y)$ for all $(x, y) \in \mathbb{R}^2$.
 - (b) Sketch contour lines for the function f .