Multi-variable Calculus
Midterm I

September 29, 2024

Fall 2024

12.1 Functions of Two Variables

- Distance between point s (x, y, z) and a, b, c in 3-space

$$= \sqrt{(x-a)^2 + (y-b)^2 + (z-c)^2}$$

12.2 Graphs & Surfaces

- The graph of a function of two variables, f, is the set of all points (x, y, z) such that $z = f(x, y)$. In general the graph of a function of two variables is a surface in 3-space.
- For a function $f(x, y)$, the function we get by holding x fixed and letting y vary is called a **cross-section** of f with x fixed. The graph of the cross-section of $f(x, y)$ with $x = c$ is the curve or cross-section, we get by intersecting the graph of f with the plane $x = c$. We define a cross-section of f with y fixed similarly.

12.3 Contour Diagrams

- Contour diagrams are used to represent functions of two variables as they are difficult to see function behavior from a surface
- Contour lines, or level curves, are obtained from a surface by slicing it with horizontal planes. A contour diagram is a collection of level curves labeled with function values.