

Lesson 22
Functions of Several Variables

So far, we have looked at functions of a single variable. In this section, we will consider functions of more than one variable.

Functions of Two Variables

Definition: A real valued function of two variables, f , consists of a set A of ordered pairs of real numbers (x, y) called the domain of the function, and a rule that associates with each ordered pair in the domain of f one and only one real number, denoted by $z = f(x, y)$.

You will need to learn two skills using functions of several variables: Evaluating at a given point and determining the domain.

Example 1: Suppose $f(x, y) = xe^{2x} - 5xy^2 + \ln(xy)$ Compute $f(-1, -3)$.
Enter the function as shown in GGB.

Command:

Answer:

Example 2: The volume of a cylindrical tank with radius r and height h is given by the formula $f(r, h) = \pi r^2 h$. Find the volume of a tank with radius 6 feet and height 20 feet.
Enter the function as shown in GGB.

Command:

Answer:

Example 3: The monthly payment that amortizes a loan of A dollars in t years when the interest rate is r per year is given by

$$P = f(A, r, t) = \frac{Ar}{\left(12 \left(1 - \left(1 + \frac{1}{12}r\right)^{-12t}\right)\right)}$$

Find the monthly payment for a mortgage of \$250,000 that will be amortized over 25 years with an interest rate of 4.5% per year.

Enter the function as shown in GGB.

Command:

Answer:

Example 4: Find the domain of the function: $f(x, y) = 2x^2 + 3y^2$

Example 5: Find the domain of the function: $f(x, y) = \frac{3x}{2x - 5y}$

Example 6: Find the domain of the function: $f(x, y) = \sqrt{16x - y}$