7.1. Functions of Several Variables

Definition 7.1.1. *A ____ is a function whose input uses two variables that do not depend on each other.*

Example 7.1.1. *Let* $f(x, y) = 2x - 4y^2$*. Find*

(1) $f(-2, 3)$

(2) $4f(-2, 3)$

Definition 7.1.2. *In the above example, we call* x *and* y *the* ______________________________.

If we say $z = f(x, y)$*, then* z *is the* ______________________________ *(which depends on* x *and* y*). The set of all ordered pairs of real numbers is the* ______________ *and the set of all corresponding values for* $f(x, y)$ *is the* ______________________

Example 7.1.2. *Find* $4f(-2,3) - 3g(1,-2)$ *if* $f(x,y) = 2x - 4y^2$ *and* $g(x,y) = 3 - x^2y^3$.

Example 7.1.3. *Find* $A(100, 0.04, 5, 2)$ *if* $A(P,r,t,n) = P(1 + \frac{r}{n})^{tn}$.

Example 7.1.4. *A company manufactures two types of calculators, A and B. The weekly price-demand equations are*

$$p = 15 - 2x + y$$

$$q = 20 + x - 2y$$

where p is the unit price of A, q is the unit price of B, x is the weekly demand for A, and y is the weekly demand for B. Find the weekly revenue function $R(x, y)$ *(in thousands of dollars), and evaluate* $R(4, 3)$

Example 7.1.5. *A company manufactures two types of calculators, A and B. The weekly price-demand equations and cost equations are*

$$p = 15 - 2x + y$$

$$q = 20 + x - 2y$$

$$C(x, y) = 20 + 2x + y$$

where p is the unit price of A, q is the unit price of B, x is the weekly demand for A, y is the weekly demand for B, and $C(x, y)$ *is the cost function. Find the profit function* $P(x, y)$ *(in thousands of dollars), and evaluate* $P(4, 3)$

(1) 63
(2) 72
(3) 85
(4) 94

Example 7.1.6. *The packaging department of a company has been asked to design a rectangular box with no top and six compartments. Let x, y, z be the dimensions of the box in inches (see figure). Find the total amount of material $M(x, y, z)$ (in square inches) used to construct the box and evaluate $M(4, 3, 2)$.*