

Building Functions of Two Variables with Cookies – Class Handout

Your group will be assigned one of the functions and domains from the list below.

Function	Domain
$f(x, y) = x + y $	$D = \{(x, y) : -2 \leq x \leq 2, -2 \leq y \leq 2\}$
$f(x, y) = xy $	$D = \{(x, y) : -2 \leq x \leq 2, -2 \leq y \leq 2\}$
$f(x, y) = 4 - x^2 - y^2 $	$D = \{(x, y) : -2 \leq x \leq 2, -2 \leq y \leq 2\}$
$f(x, y) = (x - y)^2$	$D = \{(x, y) : -2 \leq x \leq 2, -2 \leq y \leq 2\}$
$f(x, y) = x^2 - y^2 $	$D = \{(x, y) : -2 \leq x \leq 2, -2 \leq y \leq 2\}$
$f(x, y) = \sin(x) + \sin(y) $	$D = \{(x, y) : -\pi \leq x \leq \pi, -\pi \leq y \leq \pi\}$

1. Label each block on your grid with the ordered pair it represents.
2. Calculate your function's value using the x and y values for each ordered pair, and build a cookie stack of that height in the corresponding box.
3. You have only plotted a limited number of points. Describe what your shape might look like if your domain were larger. Will your function ever be negative, and if so, where?
4. Your cookies are much larger than points, making the graph *chunky*. What might your function look like if we had cookies with a much smaller diameter?
5. Look at the other functions above, and discuss with your group members what the graph might look like. Write a short description or make an informal sketch for each in the space below.

(a) $f(x, y) = |x| + |y|$

(b) $f(x, y) = |xy|$

(c) $f(x, y) = |4 - x^2 - y^2|$

(d) $f(x, y) = (x - y)^2$

(e) $f(x, y) = |x^2 - y^2|$

(f) $f(x, y) = |\sin(x) + \sin(y)|$

6. Visit the other groups to see their graphs. Do the graphs look the way you expected? If not, what was different?