

Planes

Calculus III

College of the Atlantic

1. Suppose a plane has a z -intercept of 7, a slope of -3 in the x direction and a slope of 2 in the y direction.
 - (a) If you start at the origin and walk to the point $(x, y) = (3, 5)$, what is your z -value?
 - (b) What is the equation of this plane?

	x			
	10	15	20	25
y		186		246
4				
6	132			
8				

Figure 1: Values for a linear function.

2. In Fig. 1 is shown some values for a linear function. Fill in the missing entries.
3. Consider the function $f(x, y) = 4 + x - 2y$.
 - (a) Fill out a table of values for this function for x and y from -2 to 2 , in increments of 1.
 - (b) Using your table of numbers, sketch the contour lines for this function.
 - (c) Determine the contour lines using algebra.
 - (d) Sketch $f(4, y)$. What is the meaning of this function?
 - (e) Sketch $f(x, 4)$. What is the meaning of this function?
 - (f) Suppose you are standing at the origin on this surface. What is your altitude? In what direction would you have to walk to maintain your altitude? In what direction is it the steepest up? In what direction is it the steepest down?

4. Consider a plane that passes through the points $(1, 3, -2)$, $(-1, -3, 4)$ and $(2, 1, -2)$.
- (a) Determine the equation of this plane.
 - (b) Sketch the contour lines for this plane.
 - (c) Suppose you are standing at the point $x = 1, y = 2$. What is your altitude? In what direction would you need to walk to not change altitude? In what direction is it the steepest up? In what direction is it the steepest down? Indicate these directions with arrows on your sketch.