

# 14.1: The Partial Derivative

## Calculus III

College of the Atlantic

1. Beetles are eating a deer carcass. Let  $M(t, B)$  be the mass, in kilograms, of the deer that is remaining at time  $t$  given that there were  $B$  kilograms of beetles at time  $t = 0$ . Let the time  $t$  be measured in days since the beetles started eating.
  - (a) What is the meaning of  $M(3, 2) = 28$ ?
  - (b) What is the meaning of  $M(0, 2)$ ?
  - (c) Does  $M(0, 3) = M(0, 2)$ ?
  - (d) In words, what do  $\frac{\partial M}{\partial t}$  and  $\frac{\partial M}{\partial B}$  tell you? What are the units for each of these quantities?
  - (e) What is the meaning of  $M_t(3, 2) = -0.5$ ?
  - (f) What is the meaning of  $M_B(3, 2) = -1.8$ ?
2. Let  $g(x, y) = 2x - 3y + 4$ .
  - (a) What does this surface look like?
  - (b) Compute  $g(1, -1)$ .
  - (c) Compute  $g_x(1, -1)$ .
  - (d) Compute  $g_y(1, -1)$ .
3. Let  $f(x, y) = 9 - x^2 - y^2$ .
  - (a) What does this surface look like?
  - (b) Compute  $f(1, -1)$ .
  - (c) Compute  $f_x(1, -1)$ .
  - (d) Compute  $f_y(1, -1)$ .