Partial Derivatives

1. Consider again the function $f(x, y)$ defined by the table of numbers on the other page. This is the same example we used on the first day of class. Do all of these without using algebra.

   (a) Estimate the following quantities:

      i. $f_x(0, 0)$
      ii. $f_x(1, -1)$
      iii. $f_y(1, -1)$
      iv. $f_y(1.2, 0.6)$

   (b) Sketch the following functions

      i. $f(x, 1)$
      ii. $f_x(x, 1)$
      iii. $f(0, y)$
      iv. $f_Y(0, y)$

2. 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 are B kilograms of beetles. Let the time t be measured in days since the beetles started eating.

   (a) What is the meaning of $M(3, 2) = 28$?

   (b) 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?

   (c) What is the meaning of $M_t(3, 2) = -0.5$?

   (d) What is the meaning of $M_B(3, 2) = 1.1$?

3. Repeat the first question, but use algebra to answer the questions.