

1. Suppose the concentration  $\rho$  (in mg per liter) of a drug in the blood as a function of  $x$ , the amount (in mg) of the drug given, and  $t$ , the time (in hours) since the injection, is given by

$$\rho(x, t) = 1.1 t e^{-0.9t(5-x)}$$

- (a) Find  $\rho(3, 2)$ . Give units, and interpret in terms of drug concentration.  
*Your answer should be a complete sentence, describing both inputs and outputs.*
- (b) Explain the significance of the following two single-variable functions in terms of drug concentration.

$$\rho(4, t)$$

$$\rho(x, 1)$$

- (c) What values do you think  $x$  can take? What about  $t$ ?

2. Choose a function  $f(x, y)$ .

*You may choose a simple function, but you won't get brownie points for being too clever...*

- (a) Draw at least 4 level sets  $\{f(x, y) = \text{constant}\}$ .  
*Your level sets should be drawn on the same axes, and the spacing between them should be at least roughly correct. Label each level set with the corresponding value of  $f$ .*
- (b) Graph your function while holding  $x$  fixed to a particular value, such as  $x = 0$ . Then do the same for  $y$  held fixed.
- (c) Graph your function, that is, graph  $z = f(x, y)$ .