1 Drug Concentration

Suppose the concentration ρ (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

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

(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.

$$\rho(4,t) \qquad\qquad \rho(x,1)$$

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

2 Multivariable Function

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 $z = f(x,y)$.

3 Heater (wrapup)

After completing the Heater Activity, answer the following questions. Justify your answers, using complete sentences.

(a) Where is the window?

(b) When is the window open?

(c) When is the heat on?

(d) To what temperature do you think the thermostat is set?

(e) Where is the thermostat?

4 The Park (wrapup)

After completing the Park Activity, answer the following question.

(a) The town wants to guarantee the total amount of lead in the park is less than $600g$. Find a location near the red star that achieves this level. Explain how you found this new location.