1) Consider the function

$$e^{-(x^2+y^2)} + 3e^{-2((x-2)^2+(y-3)^2)} - 4e^{-2((x+4)^2+(y+3)^2)}$$

a) Draw its isohypse plot for -5<x<5 and -5<y<5.

b) Write down the gradient ascent formula fort his problem.

c) Start from five random points and do gradient ascent. Mark the path through the gradient ascent on the contour plot.

d) Repeat b and c for gradient descent.

2) Consider the data set

(1, 3), (2, 7), (3,7), (4, 11), (5, 14), (6,21), (7, 18), (8, 18), (9, 19), (10, 23)

a) Try to fit a first order model y=ax+b to the data. Plot the resulting model over the data.

b) Try to fit a tenth order model to the data. Plot the resulting model over the data.

c) Try to fit a tenth order model to the data again, but this time using regularization. Find a good regularization constant manually. Plot the resulting model over the data.

3) Consider the data set (10, 0) (20, 0), (15, 0) (40,0) (50, 1), (60, 0), (60, 1) (70,1) (80,0), (90, 1), (95, 1), (100,1) (100, 1). Do logistic regression over this data. Plot the resulting model over the data.