# Machine Learning Homework 1

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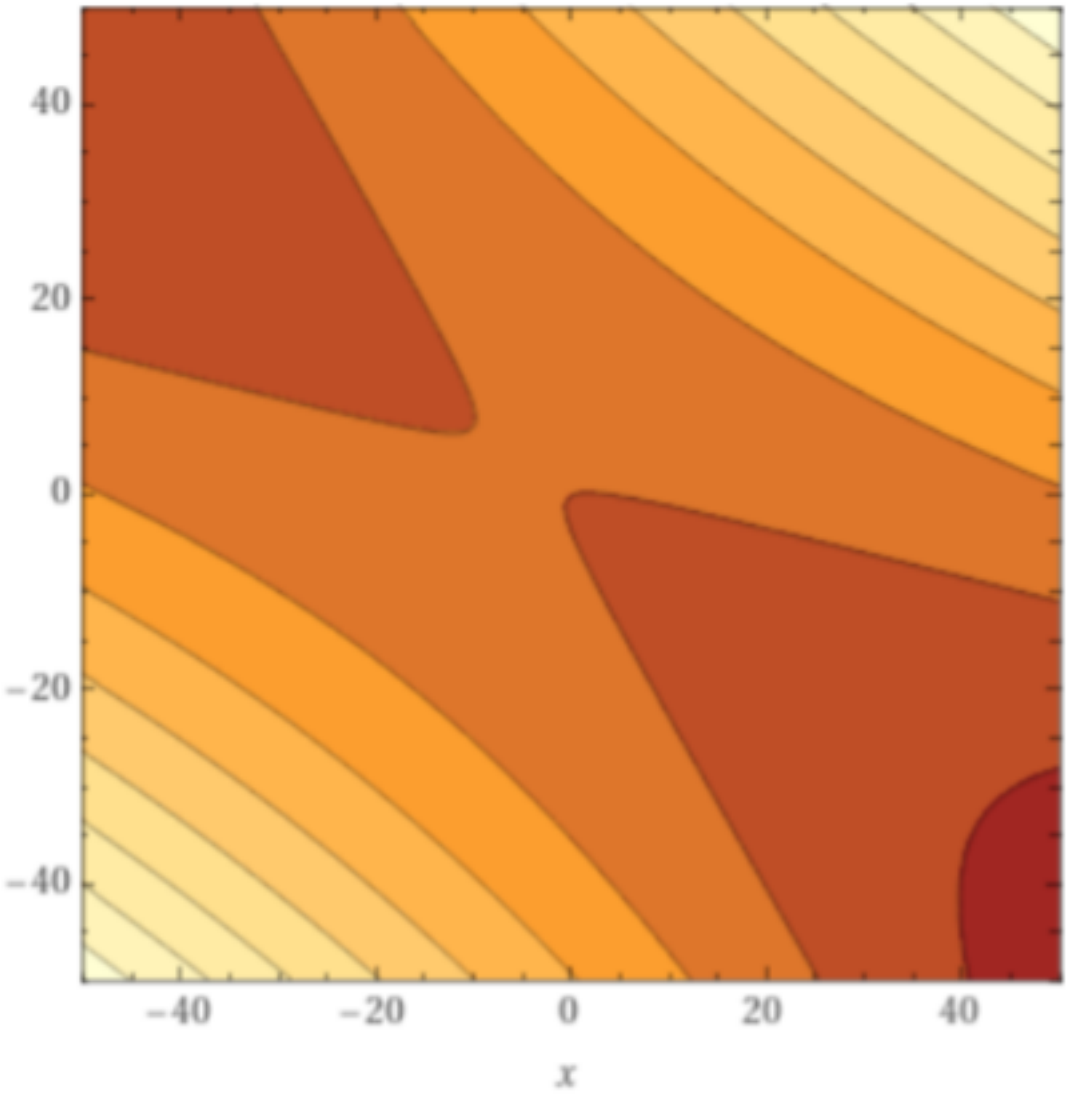
October 2020

## 1 Question 10

For the Function:

$$f(x, y) = 4x^2 + 9y^2 - 16x + 36y + 18xy + 5 \tag{1}$$

a. Show the contour plot




b. Find the partial derivative with respect to x and y
in respect to x

$$\frac{\partial}{\partial x} 4x^2 + 9y^2 - 16x + 36y + 18xy + 5 = 8x - 16 + 18y \tag{2}$$

in respect to y

$$\frac{\partial}{\partial y} 4x^2 + 9y^2 - 16x + 36y + 18xy + 5 = 18y + 36 + 18x \tag{3}$$

c. find the minimum

$$x = -\frac{26}{5} \tag{4}$$

$$y = \frac{16}{5} \tag{5}$$

# 2 Question 12

Bayes Rule and Conditional Distribution: For a company, we have collected the following information for their hiring process over the last 10 years.

Table 1:

| Education | Ph.D. | Engineering | Ph.D. in Engineering |
|---|---|---|---|
| Accepted | 10 | 25 | 45 |
| Rejected | 90 | 125 | 55 |

a. What is the probability of an applicant to have PhD in Engineering?

$$P = 28.6\% \tag{6}$$

b. What is probability of being accepted if you have an Engineering background?

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)} \tag{7}$$

$$P(B|A) = \frac{\cdot}{\cdot} \tag{8}$$

$$P(A|B) = \frac{\cdot}{\cdot} \tag{9}$$