**Exercise**

Please hand in this paper to the instructor before the end of the lecture.

Name:

Student number:                                           Date:

**Q.** You are given the following data:

|  | Features | | | Labels |
|---|---|---|---|---|
|  | | | | |
| 1 | $x_1^{(1)}$ | $\cdots$ | $x_d^{(1)}$ | $y^{(1)}$ |
| 2 | $x_1^{(2)}$ | $\cdots$ | $x_d^{(2)}$ | $y^{(2)}$ |
| $\vdots$ | $\vdots$ | | $\vdots$ | $\vdots$ |
| N | $x_1^{(N)}$ | $\cdots$ | $x_d^{(N)}$ | $y^{(N)}$ |

You are asked to fit a linear model to it. Complete the following tasks.

1. Express the model mathematically.
2. How many paramters this model will have?
3. Write down the MSE loss expression for your setup.

**Q.** Consider the following setup that shows a collection of data points. Here $x$-coordinate represents inputs and $y$-coordinates represents their respective output.
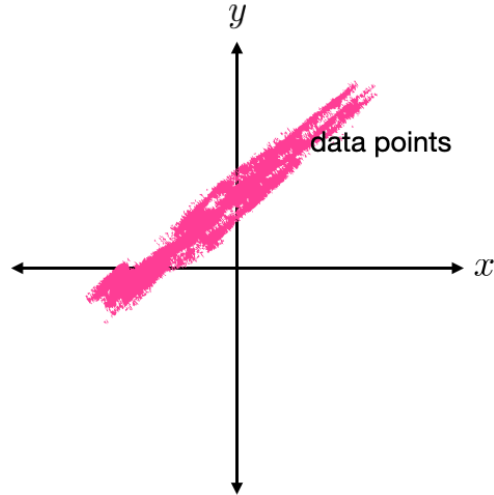


Since both $x$ and $y$ are continuous, we have a *regression* problem at our hand. We are asked to fit the following, single-parameter model to this data:

$$y = mx,$$

where $m$ is the lone model parameter.

Devise a scheme to fit this model to this data? Do you think this model has enough "model complexity" to fit this data well? Can you spot a problem? If there is a problem, can you suggest a fix.