Q1: Outdoor temperature influences natural gas consumption for the purpose of heating a house. The usual measure of the need for heating is the number of heating degree days for heating degree days. a particular day is the number of degrees the average temperature for that day is below 65°F, where the average temperature for a day is the mean of the high and low temperatures for that day. An average temperature of 20°F, for example, corresponds to 45 heating degree days. A homeowner interested in switching to solar heating panels collects the following data on her natural gas use for the months October through June, where is heating degree days x y per day for the month and is gas consumption per day in hundreds of cubic feet.

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
x	15.6	26.8	37.8	36.4	35.5	18.6	15.3	7.9	0
y	5.2	6.1	8.7	8.5	8.8	4.9	4.5	2.5	1.1

a. Calculate the correlation coefficient and interpret its value; draw a scatterplot of the data.
b. Calculate the least squares regression line $y = b_0 + b_1 x$ of gas consumption y on heating degree days x . Draw the regression line on the scatterplot.

Q2: Classify the MNIST digits using logistic regression for K=10. After finding the theta values you need to test it in the test set.