Assignment #1

1. Write a code plotting different shapes of l_p norm in 2D space of unit ball with center at origin in one graph. Below is the definition of l_p norm and unit ball:
   a. $v \in R^2$ and $v = (v_1, v_2)$, then

$$||v||_p = \left(\sum_{i=1}^{2} |v_i|^p \right)^{1/p}$$

   and $$||v||_\infty = max_{i=1,2}|v_i|$$

   b. $B_p(0,1) = \left(v \in R^2 : \left|||v|\right|_p = 1 \right)$

2. Draw a 2D and 3D plot in between error versus regression coefficients for any random ordered pair of points. The error is defined as below:

$$E = \sum_{i=1}^{n} e_i^2 = \sum_{i=1}^{n} [y_i - (c + mx_i)]^2$$

3. Using the same set of random ordered pair of points as considered in question 2, use the gradient decent method to find the optimal regression coefficients. Write a code to find the optimal regression coefficients and compare the result with manual calculation.