24-787: Machine Learning and Artificial Intelligence for Engineers
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Homework 6
Due: Mar 2 2024

Concept Questions:

Problem 1
B) Standardized and C) Normalized.

Problem 2
Log Transformation.

Problem 3

Given: $x_1 = [8, 4, 0, -4]$, $x_2 = [-16, -12, -10, 2]$

Find: Pearson's correlation coefficient

Equation: $r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$

Subject	x_1	x_2	(xy) x_1x_2	(x^2) x_1^2	(y^2) x_2^2
1	8	-16	-128	64	256
2	4	-12	-48	16	144
3	0	-10	0	0	100
4	-4	2	-8	16	4
Σ	8	-36	-184	96	504

$n = 4$
$\Sigma x = 8$
$\Sigma y = -36$
$\Sigma x^2 = 96$
$\Sigma y^2 = 504$
$\Sigma xy = -184$

$$r = \frac{4(-184) - (8)(-36)}{\sqrt{[4(96) - (8)^2][4(504) - (-36)^2]}} = \frac{-448}{480} = -0.9333.$$

$r_{x_1x_2} = -0.9333$

Problem 4
X_2.