Spring 2025

Multivariate Analysis
Assignments

- **Assignment 1 due by March 4, 2025**

1. (20 pt.) Let $\mathbf{X}_1, \ldots, \mathbf{X}_{36}$ be a random sample of size 36 from a three-variate normal distribution having mean $\boldsymbol{\mu}$ and covariance $\boldsymbol{\Sigma}$. Specify each of the following completely.
   (a) (10 pt.) The distribution of $\bar{\mathbf{X}}$.
   (b) (10 pt.) The distribution of $n(\bar{\mathbf{X}} - \boldsymbol{\mu})'\boldsymbol{\Sigma}^{-1}(\bar{\mathbf{X}} - \boldsymbol{\mu})$.
2. (80 pt.) Check whether the following data satisfy the normality assumption.

Company	X_1 =Sales	X_2 = Profits	X_3 = Assets
General Motors	126,974	4,224	173,297
Ford	96,933	3,835	160,893
Exxon	86,656	3,510	83,219
IBM	63,438	3,758	77,734
General Electric	55,264	3,939	128,344
Mobil	50,976	1,809	39,080
Philip Morris	39,069	2,946	38,528
Chrysler	36,156	359	51,038
Du Pont	35,209	2,480	34,715
Texaco	32,416	2,413	25,636

§ Extra 10 points for creating a plot of a bivariate normal distribution with $\mu_1 = \mu_2 = 2, \sigma_1 = \sigma_2 = 1$ and $\rho = 0.5$ using SAS or R.