Chapter 5. Vector random variables

- A **vector random variable** $\mathbf{X} = (X_1, X_2, \ldots, X_n)$ is a collection of random numbers with probabilities assigned to outcomes.

- $\mathbf{X}$ can also be called a **multivariate random variable**.

- The case with $n = 2$ we call a **bivariate random variable**.

- In the bivariate case, we can say X and Y are **jointly distributed random variables** which is equivalent to saying (X, Y) is a vector random variable.

- Vector random variables let us model relationships between quantities.

Example: midterm and final scores

- The file ... contains midterm and final scores for a previous STATS 401 course.

- A probability model lets us answer a question like, "What is the probability of getting at least 70% in the final if you get 60% in the midterm"

- Let x_i and y_i be the midterm and final scores for individual $i = 1, \ldots, n$. We model these as n draws of a bivariate random variable (X, Y).