Example 1:

If $X$ is a random number selected from $[1, 2, \ldots, n]$, find $E(X)$ and $E(X^2)$.

Example 2:

A coin has probability $\frac{2}{3}$ of turning up "heads". Find the expected number of tosses until the first "tail" occurs.

Example 3:

A bin of 5 electrical components is known to contain 2 that are defective. If the components are to be tested, one by one, randomly, until the defectives are discovered, find the expected number of tests that are made.