Lecture 18 Summary (Chapter 5)

**Example 12** If the probability is .05 that a certain wide-flange column will fail under a given axial load, what are the probabilities that among 16 such columns,

(a) at most two will fail?
   Since \( X \sim \text{Bin}(16, .05) \), \( P(X \leq 2) = .957 \).

(b) at least four will fail?
   \( P(X \geq 4) = 1 - P(X \leq 3) = 1 - .993 = .007 \)

\[
X \sim \text{Bin}(n, p) \implies \mu = np, \quad \sigma^2 = np(1 - p), \quad \sigma = \sqrt{np(1 - p)}
\]

**Example 13** Find the mean and variance of the probability distribution of the number of heads obtained in three flips of a balanced coin.

\[
X \sim \text{Bin}(3, .5)
\]

\[
\mu = np = 3(.5) = 1.5
\]

\[
\sigma^2 = np(1 - p) = 3(.5)(.5) = .75
\]

**Computing:** See Minitab Tutorial, Random Number Generation on the course website.