4.2.2. Let the random variable Y_n have a distribution that is $b(n, p)$.

(a) Prove that Y_n/n converges in probability p. This result is one form of the weak law of large numbers.

(b) Prove that $1 - Y_n/n$ converges in probability to $1 - p$.

(c) Prove that $(Y_n/n)(1 - Y_n/n)$ converges in probability to $p(1 - p)$.

4.2.3. Let W_n denote a random variable with mean μ and variance b/n^p, where $p > 0$, μ, and b are constants (not functions of n). Prove that W_n converges in probability to μ.
Hint: Use Chebyshev's inequality.

4.3.3. Let Y_n denote the maximum of a random sample from a distribution of the continuous type that has cdf $F(x)$ and pdf $f(x) = F'(x)$. Find the limiting distribution of $Z_n = n[1 - F(Y_n)]$.

4.3.9. Let X be $\chi^2(50)$. Approximate $P(40 < X < 60)$.