Concept Check.
(a) Compute the binomial probability $1 - P(X \leq 39) = 0.9824$ where $X$ is binomial with $n = 100$, success probability $q = 0.5$.
(b) I used the binomial distribution for both experiments. Each experiment consists of a sample of 100 binary outcomes.
(c) There is no mathematical difference in the computations above. There is a conceptual difference. In the first experiment, the success probability refers to the true proportion of college grads in the population. In the second experiment, the success probability refers to the proportion of heads/tails you would expect to observe from flipping a single coin many times. There is no "population".
(d) The answer in part (c) actually makes it clear that the first experiment is related to the hypergeometric distribution. There is a true population of size $N$ of these people. There is some exact number $M$ of successes in this population. There are many reasons why you wouldn't use the hypergeometric distribution here. Since $N$ is so large, both distributions, the hypergeometric and the binomial, will give basically the same answers. Practically, it would be impossible to do hypergeometric computations with $N$ so large (think about the factorials involved). The coin-flipping experiment cannot be related to the hypergeometric. Ask yourself, what is the underlying population? The answer is that there really isn't one. We just take one fair coin and flip it as many times as we want. The success probability is really about that coin, and not about sampling from a larger population.

5.10
(a) $\binom{12}{7}(.7^7)(.3^5) + \binom{12}{8}(.7^8)(.3^4) + \binom{12}{9}(.7^9)(.3^3) = .6293$
(b) $(.3^{12}) + 12(.7)(.3^{11}) + \binom{12}{2}(.7^2)(.3^{10}) + \binom{12}{3}(.7^3)(.3^9) + \binom{12}{4}(.7^4)(.3^8) + \binom{12}{5}(.7^5)(.3^7) =$ $.0386$.
(c) $\binom{12}{8}(.7^8)(.3^4) + \binom{12}{9}(.7^9)(.3^3) + \binom{12}{10}(.7^10)(.3^2) + \binom{12}{11}(.7^11)(.3) + (.7^12) = .7237$

5.46
(a) $\frac{\binom{2}{1}\binom{13}{4}}{\binom{15}{5}} = .4762$
(b) $\frac{\binom{2}{2}\binom{13}{3}}{\binom{15}{5}} = 0.095$

5.56
(a) $\frac{3^5 e^{-3}}{5!} = .1008$
(b) $\frac{3^0 e^{-3}}{0!} + \frac{3^1 e^{-3}}{1!} + \frac{3^2 e^{-3}}{2!} = .42$
(c) $1 - 4e^{-3} = .800852$

5.52 $\binom{7}{1}(\frac{1}{6})^2(\frac{5}{6})^7 = 0.06512$
6.6
(a) $\frac{6^4 e^{-6}}{4!} = .1338$
(b) $1 - 6^0 e^{-6} - 6^1 e^{-6} - \frac{6^2 e^{-6}}{2} - \frac{6^3 e^{-6}}{3!} = .8488$
(c) $1 - ppois(74, 72) = .3773$.