Math 6070-1, Spring 2006, University of Utah
Simulation Hints for Project #1

The key question here is, "how do we generate/simulate a binomial random variable on a computer without a canned package"? This is equivalent to asking, "how do we generate a bernoulli random variable without a canned package"? Here is how to do it using a "random number generator," which is standard in most computer environments (R, Matlab, C^{++}, etc.).

Suppose you know how to generate $X \sim \text{Uniform}(0, 1)$ [use a random-number generator]. Then, define $\rho := \mathbf{I}\{X \leq p\}$, and prove first that $\text{P}\{\rho = 1\} = p$ and $\text{P}\{\rho = 0\} = 1 - p$. That is, $\rho \sim \text{Bernoulli}(p)$. Sums of independent Bernoullis is binomial, and you are well on your way. [Most random-number generators aim to generate i.i.d. sequences. That is, if you run the same generator several times then it produces a sequence that looks i.i.d. This is true unless you generate an enormous number of rv's, but that is not the case here.]