STAT 100 SUMMER II 2000 (PROFESSOR GREEN)
SOLUTIONS TO ASSIGNED PROBLEMS DUE AUGUST 2

Problem 66. The binomial distribution for $n = 6, \quad p = \frac{2}{3}$, according to the standard formula, is as follows:

$P(X = 0) = \frac{1}{3}^6 = frac1729$
$P(X = 1) = 6 \times \frac{2}{3}\frac{1}{3}^5 = \frac{12}{729}$
$P(X = 2) = \binom{6}{2}\frac{2}{3}^2\frac{1}{3}^5 = \frac{60}{729}$
$P(X = 3) = \frac{160}{729}$
$P(X = 4) = \frac{240}{729}$
$P(X = 5) = \frac{192}{729}$
$P(X + 6) = \frac{64}{729}$

(a) This is the sum of the probabilities for zero through four successes, or $\frac{473}{729}$.
(b) This is the same as less than two successes and the probability is $\frac{13}{729}$.
(c) This is the sum of the probabilities for two through five successes or $\frac{652}{729}$.

Problem 68.

The binomial distribution in question is for $n = 8, \quad p = .85$. This time it is not quite worthwhile to work out the entire distribution.

(a) $P(X \geq 6) = P(X = 6) + P(X = 7) + P(X = 8) = .2376 + .3847 + .2725 = .8948$
(b) This is the same as the event that at least five have Rh-positive blood or $X \geq 5$. This probability can therefore be obtained by adding $P(X = 5) = .0839$ to $P(X \geq 6)$ from part (a) to obtain .9786.

Problem 70.

(a) $P(X \leq 5) = .448$
(b) $P(X \leq 11) - P(X \leq 5) = .736 - .011 = .725$
(c) $P(X = 8) = P(X \leq 8) - P(X \leq 7) = .596 - .416 = .180$

Problem 72

The variable of relevance is binomial with $n = 20, \quad p = .7$.

(a) $P(X \leq 13) = .392$
(b) $1 - P(X \leq 16) = 1 - .893 = .107$

Problem 76

The number of college students in the sample who support the increased funding is a binomial variable with $n = 20, \quad p = .2$.

(a) The mean is $20 \times .2 = 4$.
(b) $P(X \leq 4) - P(X \leq 3) = .630 - .411 = .219$

Problem 78.

The number of five year survivors in the study is binomial with $n = 19, \quad p = .8$. The mean of such a variable is $19 \times .8 = 15.2$, the variance is $19 \times .8 \times .2 = 7.6$, and the standard deviation is $\sqrt{7.6} = 2.76$.

Problem 82.

(a) The mean is 24.5, the variance is 15.925, and the standard deviation is 15.99.
(b) Since $np = 12$ and $np(1-p) = 3^2 = 9$, it follows that $1 - p = \frac{np(1-p)}{np} = \frac{9}{12} = .75$, $p = .25$, and $n = \frac{12}{p} = 48$.