Solutions for quiz 4

1. Let X be the number of games that the Cubs wins. Then X follows a binomial distribution with n=5 and p=.4.

   (a)

$$
\begin{aligned}
P(X \geq 3) &= \sum_{x=3}^{5} \binom{5}{x} (.4)^x (.6)^{5-x} \\
&= \binom{5}{3} (.4)^3 (.6)^2 + \binom{5}{4} (.4)^4 (.6) + \binom{5}{5} (.4)^5 \\
&= .2304 + .0768 + .01024 = .31744
\end{aligned}
$$

   (b)

$$
P(X \geq 1) = 1 - P(X = 0) = 1 - (.6)^5 = .92224
$$

2. Let X be the test score.

   (a)

$$
\begin{aligned}
P(400 \leq X \leq 480) &= P(\frac{400-420}{80} \leq \frac{X-420}{80} \leq \frac{480-420}{80}) \\
&= P(-.25 \leq Z \leq .75) \\
&= 1 - P(Z \leq .-25) - P(Z \geq .75) \\
&= 1 - .4013 - .2266 = .3721
\end{aligned}
$$

   (b) Let x_0 be the minimum score needed to be in the top 20%. Then it is necessary to have

$$
\begin{aligned}
P(X \geq x_0) &= .2 \\
P(Z \geq \frac{x_0 - 420}{80}) &= .2 \\
\frac{x_0 - 420}{80} &= .84 \\
x_0 = 420 + (.84)(80) &= 487.2
\end{aligned}
$$