Math 152 – Fall 2008
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warm-up # 6

Name: ________________________________

According to some investors, foreign stocks have the potential for high yield, but the variability in their dividends may be greater than what is typical for American companies. If **we believe that foreign stock prices are distributed similarly (normal with the same mean and variance)** to American stock prices, how likely is it that a sample of 10 foreign stocks would produce a standard deviation which is 50% bigger than American stocks?

Solution:

$$
\begin{aligned}
P(\hat{\sigma}/\sigma > 1.5) &= ? \\
\frac{\sum(X_i - \overline{X})^2}{\sigma^2} &\sim \chi^2_{n-1} \quad \text{(normality assumption)} \\
\frac{\sum(X_i - \overline{X})^2}{\sigma^2} &= n\frac{\sum(X_i - \overline{X})^2/n}{\sigma^2} \\
&= \frac{n\hat{\sigma^2}}{\sigma^2} \\
P(\hat{\sigma}/\sigma > 1.5) &= P(\hat{\sigma}^2/\sigma^2 > 1.5^2) \\
&= P(n\hat{\sigma}^2/\sigma^2 > n1.5^2) \\
&= 1 - \chi^2_{n-1}(n1.5^2) \\
&= 1 - \chi^2_{n-1}(22.5) < .01 \qquad \text{(see table pg 774-775)}
\end{aligned}
$$