Due: Thursday, March 24th 2016
Problem to be turned in:

1. Suppose X_1, X_2, X_3 be random variables such that $X_i \sim$ Normal (i, i^2). Find f such that
   (a) $f(X_1, X_2, X_3) \sim \chi^2_3$
   (b) $f(X_1, X_2, X_3) \sim t_2$
   (c) $f(X_1, X_2, X_3) \sim F(1, 2)$
2. Let $m \leq n$. Suppose $X \sim \chi^2_m$ and $Y \sim \chi^2_n$. Show that $P(X \geq a) \leq P(Y \geq a)$ for all $a \in \mathbb{R}$.
3. Let $X_1, X_2, \ldots, X_n$ be i.i.d. X such that $Var[X] = \sigma^2$. Let $Y_1, Y_2, \ldots, Y_n$ be i.i.d. Y such that $Var[Y] = \sigma^2$. Find a sutiable n such that
$$P(\mid \bar{X}_n - \bar{Y}_n \mid < \frac{\sigma}{5}) \approx 0.99.$$
4. Let $X_1, X_2, \ldots, X_{100}$ be i.i.d. X such that $Var[X] = 16$. Find $\beta < \alpha > 0$ such that
$$P(\beta < \bar{X}_{100} - \mu < \alpha) \geq 0.90.$$
   using: (a) Central limit Theorem and (b) Chebychev's Inequality.