

MATH 302 WORKSHEET 1 $\frac{e}{\pi^2}$ SPRING 2012

Note:

Theorem 3: Let $X \sim \text{Nor}(x, \mu, \sigma)$. Let $Z = \frac{X - \mu}{\sigma}$ it is the case that $Z \sim \text{Nor}(z, 0, 1)$.

Theorem 4: Let $Z \sim \text{Nor}(z, 0, 1)$. Let $Y = Z^2$ it is the case that $Y \sim \chi_1^2$.

Theorem 4 1/2: Let $X \sim \chi_n^2$ and $Y \sim \chi_m^2$ and X and Y be independent. Let $W = X + Y$ it is the case that $W \sim \chi_{(n+m)}^2$.

Theorem 5: Let Z_1, Z_2, \dots, Z_n be independent, identically distributed random variables from $Z \sim \text{Nor}(z, 0, 1)$. Let $U = Z_1^2 + Z_2^2 + \dots + Z_n^2 = \sum_{j=1}^n Z_j^2$ it is the case that $U \sim \chi_n^2$.

Theorem 6: Let $X \sim \text{Nor}(x, \mu, \sigma)$. Let X_1, X_2, \dots, X_n be independent, identically distributed random variables from $X \sim \text{Nor}(x, \mu, \sigma)$ Let $Y = \sum_{i=1}^n X_i$ it is the case that $Y \sim \text{Nor}(y, n \cdot \mu, \sqrt{n \cdot \sigma^2})$.

Problems: for approximations please report with one decimal place accuracy.

Using handout 1 $\frac{e}{\pi^2}$ (chi-squared tables)

1T. Let $X \sim \chi_{(14)}^2$. Find the approximate $\Pr(X < 30)$. 2T. Let $X \sim \chi_{(19)}^2$. Find the approximate $\Pr(X \geq 42)$.
3T. Let $X \sim \chi_{(27)}^2$. Find the approximate $\Pr(X < 40)$. 4T. Let $X \sim \chi_{(27)}^2$. Find the approximate $\Pr(X \geq 27)$.

3T. Let X_1, X_2, \dots, X_{20} be independent, identically distributed random variables from $\text{Chi}(x, 1)$.

Let $Y = \sum_{i=1}^{20} X_i$. Find the approximate $\Pr(Y = 30)$.

4T. Let X_1, X_2, \dots, X_{20} be independent, identically distributed random variables from $\text{Chi}(x, 1)$.

Let $Y = \sum_{i=1}^{20} X_i$. Find the approximate $\Pr(Y \geq 30)$.

Using Maple or Mathematica

1M. Let $X \sim \chi_{(14)}^2$. Find the approximate $\Pr(X < 30)$. 2M. Let $X \sim \chi_{(19)}^2$. Find the approximate $\Pr(X \geq 42)$.

3M. Let $X \sim \chi_{(27)}^2$. Find the approximate $\Pr(X < 40)$. 4M. Let $X \sim \chi_{(27)}^2$. Find the approximate $\Pr(X \geq 27)$.

5M. Let X_1, X_2, \dots, X_{20} be independent, identically distributed random variables from $\text{Chi}(x, 1)$.

Let $Y = \sum_{i=1}^{20} X_i$. Find the approximate $\Pr(Y \geq 30)$.