

5080-Quiz

Name: 1. Let X_1 and X_2 be two independent normal random variables. X_1 is normal $N(0, 4)$, X_2 is normal $N(0, 9)$. Compute

$$P\left\{\frac{X_1}{|X_2|} \leq 2\right\}$$

using one of the enclosed tables.

$$P\left(\frac{X_1}{|X_2|} \leq 2\right) = P\left(\frac{\frac{X_1}{2}}{\sqrt{\left(\frac{X_2}{3}\right)^2}} \leq \frac{2 \cdot 3}{2}\right)$$

$$= P(T(1) \leq 3)$$

where $T(1)$ has a t -distribution with 1 degree of freedom.

There is a problem on the back.

2. Let X_1, X_2 and X_3 be three independent random variables. X_1 is $\chi^2(3)$ and X_2 is $\chi^2(2)$ and X_3 is $\chi^2(2)$. Compute

$$P\{X_1/(X_2 + X_3) \leq 1\}$$

using one of the enclosed tables.

$$X_2 + X_3 \sim \chi^2(4)$$

$$P\left(\frac{X_1}{X_2 + X_3} \leq 1\right) = P\left(\frac{\left(\frac{X_1}{3}\right)}{\left(\frac{X_2 + X_3}{4}\right)} \leq \frac{4}{3}\right)$$

$$= P\left(F(3,4) \leq \frac{4}{3}\right)$$

where $F(3,4)$ has an F distribution with 3 numerator and 4 denominator degrees of freedom.