STA260 Summer 2025 - Tutorial 1

July 2025

Questions:

Question 1

Let X have a $\chi^2(r)$ distribution. If $k > -\frac{r}{2}$, then $\mathrm{E}\left[X^k\right]$ exists. Prove that

$$\mathrm{E}\left[X^k\right] = \frac{2^k \Gamma\left(\frac{r}{2} + k\right)}{\Gamma\left(\frac{r}{2}\right)}, \quad \text{if } k > -\frac{r}{2}$$

Question 2

Let X have the uniform distribution with pdf

$$f(x) = \begin{cases} 1 & \text{if } 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}.$$

Find the cdf of $Y = -2 \log X$. What is the pdf of Y ?