

TMA 4275 Lifetime analysis

Exercise 2 - solution

Problem 1

By using formulas derived on the lectures

$$\text{MTTF} = \theta \Gamma\left(\frac{1}{\alpha} + 1\right) = 18054.906$$

$$\text{SD}(T) = \theta \left(\Gamma\left(\frac{2}{\alpha} + 1\right) - \Gamma^2\left(\frac{1}{\alpha} + 1\right) \right)^{\frac{1}{2}} = 12258.716$$

$$\text{median}(T) = \theta (\ln(2))^{\frac{1}{\alpha}} = 15664.395$$

Problem 2

Recall that $R_{Weibull(\alpha, \theta)}(t) = e^{-\left(\frac{t}{\theta}\right)^\alpha}$ and $R_{exponential(\theta)}(t) = e^{-\frac{t}{\theta}}$.

Let $Y = \left(\frac{T}{\theta}\right)^\alpha$. Then

$$R_Y(t) = P\left(\left(\frac{T}{\theta}\right)^\alpha > t\right) = P(T > \theta t^{\frac{1}{\alpha}}) = R_{Weibull(\alpha, \theta)}(\theta t^{\frac{1}{\alpha}}) = e^{-t} = R_{exponential(1)}(t)$$

Problem 3

See section "Earlier exams" on the course webpage.

Problem 4

See section "Earlier exams" on the course webpage.