1. A manufacturing company produces many different products for wholesale distribution. Its flagship product, a reverse cylindrical dipolar tube, has a failure distribution given by the following PDF:

$$f\left(t\right)= \left\{\begin{array}{c}0.000192t^{2} 0\leq t\leq 25 years\\0 elsewhere\end{array}\right.$$

1. Find $R\left(15\right)$ and MTTF
2. Find the probability that a failure will occur after the second year and by the end of the tenth year.
3. Find the median time to failure $t\_{med}$.
4. Construct the hazard rate function, λ(t). Is it IFR, DRF, or CFR?
5. The time to failure in operating hours of a critical solid-state power unit has the hazard rate function

$λ\left(t\right)=0.003\left(\frac{t}{500}\right)^{0.5}, for t\geq 0$

1. What is the reliability if the power unit must operate unit must operate continuously for 50 hours?
2. Determine the design life if a reliability of 0.90 is desired.
3. A system contains 10 serially related identical components with CFR hazard $λ\_{com}$. If a design life of 5 years with a reliability of 0.92 is required, what should the system MTTF and median time to failure be? What will the component MTTF be?
4. Time to failure for a product follows a Weibull distribution with β = 2 and η = 400 months.

 **Please use R code to calculate these answers, and show R code along with your answers.**

1. What is the reliability at 150 months?
2. What is the probability of failure in 300 months?
3. Now suppose shape = 1. Find the reliability at 150 months. What is the reliability at 300 months, given that the product survived up to 150 months? Compare the two resulting values and comment on your observation