

6. An axial force $P \sim N(50, 5^2)$ kN is applied to a circular shaft. The allowable axial extension is $\delta_a = 0.02$ mm. If the tensile spring constant of the shaft is $k \sim N(3.5 \times 10^9, (3 \times 10^7)^2)$ N/m, estimate the probability of failure using the First Order Second Moment Method. Assume that P and k are independent.

Answer: $p_f = 3.57(10^{-5})$