

16. A reversing nominal stress $S_{rev} \sim N(390, 5^2)$ MPa with the number of cycles $N_c \sim N(50,000, 2000^2)$ is applied to a shaft with the ultimate strength of $S_{ut} = 720$ MPa and the endurance limit of $S_e = 300$ MPa. The fatigue strength fraction is determined as $f = 0.86$. If S_{rev} and N_c are independent, estimate the probability of failure using the First Order Second Moment Method.

Answer: $p_f = 8.70(10^{-4})$