

2. A steel bar has a diameter of $d \sim N(0.9, 0.01^2)$ in and a length of $l = 25$ in, respectively. The shear modulus is $G = 11.5(10^6)$ kpsi and the allowable torsional stress is $\tau_a \sim N(10, 1^2)$ kpsi. If the maximum probability of failure is designed to be $p_f = 10^{-5}$, determine the maximum angle of twist of the bar. Note that d and τ_a are independent.

Answer: $\theta = 0.0276$ rad