44. A beam cantileverd at point O is subjected to a force $F \sim N(1000,\ 100^2)$ lbf shown in the figure. The beam has a round cross section and the allowable bending stress is $S_a \sim N(20,\ 2^2)$ kpsi. If the maximum probability of failure is designed to be $p_f = 10^{-5}$, determine the minimum diameter of the beam and select a preferred diameter using the First Order Second Moment Method. Note that F and S_a are independent.

Answer: $d_{min} = 0.993$ in, $d_{preferred} = 1.00$ in