1. A steel beam has a diameter of 1 in, and the deflection in any direction at $x = 8$ in is required to be less than $\delta = 0.0041$ in. Find the probability of failure given that $P_y \sim N(100, \ 10^2)$ lbf and $P_z \sim N(160, \ 20^2)$ lbf using Monte Carlo Simulation. Note that P_y and P_z are independent.

Answer: $p_f = 9.742(10^{-2})$