

4-5. The forces acting on a beam are shown in the figure. P is a random force with $P \sim N(700, 70^2)$ lb, and q is a distributed load with $q \sim N(900, 20^2)$ lb/ft. The beam has a square cross section of 6 in on each side, and its allowable bending stress is $S_a \sim N(12, 1.5^2)$ ksi. P , q , and S_a are independent. Determine the probability of failure of the beam. (**Ans.** $p_f = 3.37 \times 10^{-4}$)

