

4-3. Two independent vertical random forces $P_1 \sim N(500, 55^2)$ lb and $P_2 \sim N(800, 60^2)$ lb act on a shaft in the figure below. The sleeve bearings at A and B support only vertical forces. The allowable bending stress of the shaft is $S_a \sim N(50, 4^2)$ ksi. Determine the diameter of the shaft so that the probability of failure is less than 10^{-4} . (**Ans.** $d > 1.569$ in.)

