1-7.   A bolt passes through a steel plate that has a head that is 5 mm thick and has a normally distributed load $P \sim N(5500, 600^2)$ N applied as shown. If the bolt shaft has a diameter of 10 mm and the bolt head has an allowable shear stress $S_a \sim N(50, 6^2)$ MPa, what is the probability that the bolt head will fail? Assume P and S_a are independent variables.   (**Ans.** $p_f = 0.017562$)