27. A brittle thin plate with a 10 mm-diameter hole in the center is subjected to a random force $P \sim N(30, 5^2)$ KN. The plate has a a thickness of $t = 5$ mm and a width of $w = 100$ mm. The stress concentration factor is given as $K_t = 2.7$. If the yield strength is $S_y \sim N(300, 3^2)$ MPa, and P and S_y are independent, estimate the probability of failure using the First Order Second Moment Method.

Answer: $p_f = 3.44(10^{-5})$