Homework 8

The surface of a cam is expressed by a logarithmic spiral formula $r = ke^{0.05\theta}$ mm, where θ is in radians. Due to the uncertainty in the manufacturing process of the cam, the coefficient k follows a normal distribution of $k \sim N(19, 0.15^2)$. The cam rotates at an constant angular velocity of $\omega = 6$ rad/s. Determine the distribution of the velocity and the acceleration of the point on the cam that contacts the follower rod AB at the instant $\theta = \dfrac{\pi}{4}$. If the allowable acceleration of AB is $a = 780$ mm/s^2, find the probability of failure of the system.

(**Ans.** $v_c \sim N(118.71, 0.94^2)$mm/s, $a_c \sim N(753.83, 5.95^2)$mm/s^2, $p_f = 5.4632 \times 10^{-6}$)