6. A torsion bar AB is fixed at A and supported at B, being connected to a cantilever BC. The spring rate of bar AB is $k_{AB} \sim N(\mu_{AB}, \sigma_{AB}^2)$, and the spring rate of the cantilever BC is $k_{BC} \sim N(\mu_{BC}, \sigma_{BC}^2)$. The force acting on point C is distributed with $P \sim N(\mu_P, \sigma_P^2)$. If k_{AB}, k_{BC} and P are independent, what is the overall spring rate with respect to the vertical deflection δ at C? Find its mean and standard deviation using the First Order Second Moment Method.

Answer: $\mu_k = \dfrac{\mu_{AB}\mu_{BC}}{\mu_{AB} + \mu_{BC}l_{BC}^2}, \sigma_k = \dfrac{\sqrt{\mu_{BC}^4 l_{BC}^4 \sigma_{AB}^2 + \mu_{AB}^4 \sigma_{BC}^2}}{(\mu_{BC}l_{BC}^2 + \mu_{AB})^2}$