1. $N$ is a Geometric $(P)$ random variable. The success probability $P$ itself is a Uniform random variable independent of $N$. You observe that $N=2$. What is the PDF of $P$ given this event? (Optional) In general what is the PDF of $P$ given $N$ ?
2. Let $X$ be an Exponential $(\lambda)$ random variable. Find the PDF of the random variables (a) $Y=X^{2}$ and (b) $Z=e^{-\lambda X}$.
3. Raindrops hit your head at a rate of 1 per second. What is the PDF of the time at which the second raindrop hits you? How about the third one? (Hint: convolution)
4. The body temperatures of a healthy person and an infected person are $\operatorname{Normal}\left(36.8,0.5^{2}\right)$ and Normal( $37.8,1.0^{2}$ ) random variables, respectively. About $1 \%$ of the population is infected.
(a) What is the conditional probability that I am infected given that my temperature is $t$ ?
(b) For which values of $t$ am I more likely to be infected than not?
