1) The temperature variation from one day to another is found to be distributed normally with expected value 3F and variance 3F when temperature are measured in Fahrenheit. Recalling that x Fahrenheit are equivalent to $y = 5(x - 32)/9$ Celsius what is the probability distribution of the temperature variation when measured in Celsius.
2) Two machines produces produce the same pill for a pharmaceutical company. Call X_1 the amount of active substance in the pills produced by the first machine and X_2 the amount of active substance in the pills produced by the second machine. After a quality review it is found that X_1 and X_2 are distributed normally with $X_1 \simeq N(1.05, 0.01)$ and $X_1 \simeq N(0.98, 0.001)$. Assuming that the two machines produce the same amount of pills and that the pill are randomly mixed before being shipped out what is the probability distribution of the amount of active substance in the pills shipped
3) To be acceptable the pills must have an amount of active substance between 0.99 and 1.01. Which of the two machines has an higher probability of producing an acceptable pill.
4) If after being shipped one pill is checked and found having an amount of active substance greater that 1.05 what is the probability that it was produced by the first machine.
5) At a bus stop a new passenger arrives every minute. The arrival time for the bus is distributed exponentially with parameter $\lambda = 0.1$. The bus can carry only 10 passenger. What is the probability that there will be passenger left at the bus stop after the bus arrived.
6) If X is an exponential r.v. with parameter λ compute the median of X. Which is larger, the median or the average?
7) In a room you have 10 independent bulbs each of which has a life time distributed exponentially with parameter 0.1 when the time is measured in days. What is the probability distribution of the number of working bulbs after 10 days.
8) A person works to install the operating system on a computer and a second one configure it after installation. Calling X the time needed by the first worker we know that it is distributed exponentially with parameter 1 when the time is measured in hours. If the first worker needed x hours to complete his job we know that the second one will need a time Y that is distributed exponentially with parameter $0.5x$. Write the joint p.d.f. of X and Y. Write an expression for the expected value of the total time needed to complete the installation and configuration. Can you compute it?
9) Four independent dices are rolled. Let X_i be the outcome of the i-th dice and let $Y = X_1 + X_2$, $Z = X_3 + X_4$. Are Y and Z independent? Why?