Transformations Applications

YOUR NAME

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Exercises

1. Let X be a random variable and let g be a function. By this point, it should be clear that $\mathrm{E}[g(X)]$ is not necessarily equal to $g(\mathrm{E}[X])$.

Let $X \sim \mathsf{Expon}(\lambda = 0.5)$ and $g(X) = X^2$. We know that $\mathrm{E}(X) = \frac{1}{0.5} = 2$ so $g(\mathrm{E}(X)) = \mathrm{E}(X)^2 = 4$. Use `R` to find $\mathrm{E}[g(X)]$.

2. Let $X \sim \mathsf{Binom}(n, \pi)$. What is the pmf for $Y = X + 3$? Make sure you specify the domain of Y. [Note, we have used p for the probability of success in a binomial distribution.]

3. Let $X \sim \mathsf{Expon}(\lambda)$. Let $Y = X^2$. Find the pdf of Y.

4. ADVANCED: In exercise 3, you found the pdf of $Y = X^2$ when $X \sim \mathsf{Expon}(\lambda)$. Rearrange the pdf to show that $Y \sim \mathsf{Weibull}$ and find the parameters of that distribution.

5. You are on a team of two. You are both tasked to complete an exercise. The time it takes you T_1, and likewise, your teammate $T_{@}$ are uniformly distributed on the interval of 10 to 30 minutes. You work independently of each other, simulate and plot the distribution of $T_1 + T_2$