1. In a certain forest, let $X$ denote the percentage of days (in a certain chosen period of time) on which it rains. Suppose that $X$ is a Beta random variable with $\alpha = 6$ and $\beta = 2$.

1a. What is the expected value of $X$?
1b. What is the probability density function of $X$?
1c. Verify that this function is a valid probability density function.

2. For the random variable $X$ in question 1, find $P(X < 1/4)$.

3. Suppose that $X$—the percentage of time that Forrest feels hungry—is a Beta random variable with parameters $\alpha = 2$ and $\beta = 3$.

Suppose that $U$ is a continuous uniform $(0, 1)$ random variable.

Calculate $P(U > X)$.

4. Review question: Suppose that Forrest rolls a die until the first occurrence of 6, and then he stops; let $X$ denote the number of his rolls. Suppose that Dr. Ward flips a coin until the first head appears, and then he stops; let $Y$ denote the number of his flips. If $X$ and $Y$ are independent, find $P(X \geq Y)$. 