Show **all** of your work on this assignment and answer each question fully in the given context. You have 20 minutes. Each problem is designed to take 10 minutes. All answers in a topic must be correct for any credit for that topic. You may attempt multiple topics. You may use a calculator on this competency quiz.

1. **Competency Topic: Discrete Random Variables**

   Let X be a random variable with the following distribution with probability function

$$f(x) = \begin{cases} \frac{c}{x} & x = 1, 2, 3, 4 \\ \\ 0 & o.w. \end{cases}$$

   where c is a constant.

   a. Find the value of c that makes $f(x)$ a valid probability function.

   b. Find the value of $E(X)$.

   c. Find the value of σ^2 for this random variable.

2. **Competency Topic: Continuous Random Variables**

A Weibull random variable is a continuous random variable with cumulative density function:

$$F(x) = \begin{cases} 0 & x < 0 \\ \\ 1 - e^{-(x/\alpha)^{\beta}} & x \geq 0 \end{cases}$$

for any $\alpha > 0$ and $\beta > 0$.

a. Find the probability that X is less than 3 (the answer will include in terms of α and β).

b. Find the probability density function of X (the answer will include α and β)