

111. Once a fire is reported to a fire insurance company, the company makes an initial estimate, X , of the amount it will pay to the claimant for the fire loss. When the claim is finally settled, the company pays an amount, Y , to the claimant. The company has determined that X and Y have the joint density function

$$f(x, y) = \frac{2}{x^2(x-1)} y^{-(2x-1)/(x-1)} \quad x > 1, y > 1.$$

Given that the initial claim estimated by the company is 2, determine the probability that the final settlement amount is between 1 and 3.

- (A) $\frac{1}{9}$
- (B) $\frac{2}{9}$
- (C) $\frac{1}{3}$
- (D) $\frac{2}{3}$
- (E) $\frac{8}{9}$