

65. Impurities in batches of product of a chemical process reflect a serious problem. If the proportion of impurities exceeds 0.6, the batch is unacceptable. It is known that the proportion of impurities  $Y$  in a batch has the density function

$$f_Y(y) = \begin{cases} 10(1-y)^9, & 0 \leq y \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

- (a) Using the properties of density functions, verify that the above is a valid density function.
- (b) What is the probability that a batch is not considered acceptable?
- (c) What is the probability of distributions that  $f_Y(y)$  is a member of? What are the parameters and their values? Use R to create plots of the PDF and CDF for this distribution.
- (d) What is the mean proportion of impurities in the batch? What is the variance?