5. [10 points] Consider a group of people who have received a new treatment for pneumonia. Let t be the number of days it takes for a person with pneumonia to fully recover. The probability density function giving the distribution of t is

$$f(t) = \frac{10}{(1 + at)^2}, \qquad \text{for } t > 0,$$

for some positive constant a.

a. [2 points] Give a practical interpretation of the quantity $\displaystyle\int_3^{10} f(t)dt$. You do not need to compute the integral.

b. [5 points] Find a formula for the cumulative distribution function $F(t)$ of $f(t)$ for $t > 0$. Show all your work. Your answer may include a. Your final answer should not include any integrals.

c. [3 points] Determine the value of a. Show all your work.