Probability and Statistics Exam, 7

1) The probability that the battery of a particular car brand does not start is 0.03. Find the probability of the following events:

   a) (1 point) A : the battery only starts on the 3rd attempt;

   b) (2 points) B : the battery starts on the first at least 25 consecutive attempts.

2) (2 points) Let $X \in \chi^2(2,1)$. Find the pdf of $Y = \sqrt{X}$.

3) Let $X_1, X_2, ..., X_n$ be a random sample drawn from a distribution with pdf $f(x; \theta) = (1 + \theta)x^\theta$, for $0 < x < 1$, with $\theta > -1$, unknown.

   a) (2 points) Find the method of moments estimator, $\hat{\theta}$, for θ.

   b) (2 points) Find the maximum likelihood estimator, $\bar{\theta}$, for θ.