(a) Find the distribution of $Y_i = -\ln(2X_i - X_i^2)$.

(b) Find the maximum likelihood estimator (MLE) for θ. Show that it is an asymptotically unbiased estimator for θ.

(c) Find the uniformly minimum variance unbiased estimator (UMVUE) for θ.

(d) Is the UMVUE an e cient estimator of θ