1: (a) Let $X_1, \ldots, X_n$ be an independent sample from the binomial density with mean $\Theta$: 
$p(x; \Theta) = \Theta^x (1-\Theta)^{1-x}; \ x=0,1, \ 0<\Theta<1; \text{ and zero elsewhere. Find the maximum likelihood estimate of } \Theta$.

(b) Is the maximum likelihood estimate unbiased?

2: (a) Let $X_1, \ldots, X_4$ be an independent sample from the density: 
$p(x; \Theta) = 1/\Theta \ x=0<x<\Theta, \ 0<\Theta; \text{ and zero elsewhere. Let } Y_1 < Y_2 < Y_3 < Y_4, \text{ be the order statistics---smallest to largest. Then } p(Y; \Theta) = 4!/\Theta^4; \ 0<Y_1 < Y_2 < Y_3 < Y_4 < \Theta. \text{ Show that } Y_4 \text{ is a sufficient statistic for } \Theta.