Final Exam Practice

1. Let (X, Y) admits the following joint density

$$f(x, y) = 2e^{-x-y},\ x > y > 0.$$

(1) Find $P(X \leq 2Y)$.
(2) Find Ee^Y .
(3) Find $f_{X|Y}(x|y)$.
(4) Find $E[X|Y = 2]$.

2. Define the Binomial, Geometric, Poisson, Negative Binomial and Hypergeometric distributions.

3. Let X admit the density function

$$f(x) = e^{-x}, x \geq 0$$

(1) Find the density of $U = 3X + 2$.
(2) Find the density of $U = X^2$.

4. Let $X_1, \cdots, X_n$ be independent random variables with same density

$$f(x) = e^{-x},\ x > 0.$$

Find the distribution of $X_{(1)}$ and $X_{(n)}$.

5. Let X have the density

$$f(x) = 2e^{-2x},\ x > 0.$$

Find $P(X > 2)$ and EX.

6. It is known that a quarter of the population in Lubbock catches a specific flu. An investigation shows that in a test, the probability for correct positive and correct negative are 0.81 and 0.99. Denis receives 1 positive result and 1 negative result. What is the probability that Denis catches the flu?

7. The random variable X admits the following distribution

x	-1	0	1
$P(X = x)$	0.1	0.5	p

(1) Find p.
(2) Find the mean and variance of X.