

Math 3338
Midterm review sheet

1. Let T be an exponential random variable with mean 5.
 - a. Find $P(T > 5)$. 10 pts
 - b. Find $P(T > 8 \mid T > 3)$. 10 pts

2. Suppose X is a random variable with moment generating function
$$M(t) = \frac{1}{3}e^{-3t} + \frac{1}{6} + \frac{1}{4}e^{2t} + \frac{1}{4}e^{4t}$$
 - a. Find $E(X)$. 10 pts
 - b. Find $\text{Var}(X)$. 10 pts
 - c. Find $P(X < 0)$. 12 pts

3. Let X be a random variable with density function
$$f(x) = \frac{1}{2\sqrt{x}}, \quad 0 < x \leq 1$$
Find $E(X)$ and $\text{Var}(X)$. 12 pts

4. Let X and Y have joint p.d.f.
$$f(x, y) = \begin{cases} 6(1 - (x + y)), & x > 0, y > 0, x + y < 1 \\ 0, & \text{otherwise} \end{cases}$$
 - a. Determine the probability that $X < .2$. 14 pts
 - b. Find the marginal density for X . 14 pts

5. An insurance company insures a large number of homes. The insured value, X , of a randomly selected home is assumed to follow a distribution with density function
$$f_X(x) = \begin{cases} 3x^{-4} & \text{for } x > 1 \\ 0 & \text{otherwise} \end{cases}$$
Given that a randomly selected home is insured for at least 1.5, what is the probability that it is insured for less than 2?

6. Random variables X and Y have joint p.d.f:
$$f_{XY}(x, y) = \frac{1}{2}, \quad 0 \leq x \leq y \leq 2.$$
 - a. Find the marginal pdf's $f_X(x)$ and $f_Y(y)$. 12 pts
 - b. Find the conditional pdf $f_{X|Y=y}(x)$. 12 pts

7. Bowl A contains 4 red chips and 8 white chips.
Bowl B contains 8 red chips and 4 white chips.
Bowl C contains 6 red chips and 6 white chips.
One of the bowls is selected at random, and a chip is drawn. If this chip is white, what is the probability that Bowl A was chosen?