

(Due Wednesday 10/03/2018 right before class)

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(Your homework shall be stapled if it contains multiple pages.)

FALL/2018/MA526: HOMEWORK 6

Instructor: Guangqu Zheng¹; Grader: Chessa Mccalla²

Total points: 20.

Q1 (4pt) Consider the probability density function of X : $f(x) = k\sqrt{x}$ for $x \in (0, 1)$ and $f(x) = 0$ elsewhere.
(1) First find the value of k (2pt) (2) find the CDF and use it to evaluate $\mathbb{P}(0.3 < X < 0.6)$. (2pt)

Q2 If a dealer's profit, in units of \$5000, on a new automobile can be looked upon as a random variable X having the density function

$$f(x) = \begin{cases} 2(1-x) & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

- (1) Find the average profit per automobile. (2pt)
- (2) Find the standard deviation of profit per automobile. (2pt)

Q3 Let X, Y be random variables with joint density function

$$f(x, y) = \begin{cases} 4xy & 0 < x, y < 1 \\ 0 & \text{elsewhere} \end{cases}$$

- (1) Are they independent? (2pt)
- (2) Find the expected value of $\sqrt{X^2 + Y^2}$. (2pt)

Q4 (3pt) Suppose that airplane engines operate independently and fail with probability equal to 0.4. Assuming that a plane makes a safe flight if at least one-half of its engines run, determine whether a 4-engine plane or a 2-engine plane has the higher probability for a successful flight.

Q5 (2pt) A safety engineer claims that only 40% of all workers wear safety helmets when they eat lunch at the workplace. Assuming that this claim is right, find the probability that 4 of 6 workers randomly chosen will be wearing their helmets while having lunch at the workplace.

Q6 (3pt) Find the probability that a person flipping a coin gets the third head on the seventh flip.

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