

## Homework 07

STAT 509 Statistics for Engineers

Summer 2017 Section 001

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### Question 01

In 1990 the lead concentration in gasoline ranged from 0.1 to 0.5 grams/liter. Let  $Y$  = grams per liter of lead in gasoline. The probability density function for  $Y$  is

$$f(y) = 12.5y - 1.25; \quad 0.1 < y < 0.5.$$

- (a) What is the probability that a random liter of gasoline would contain between 0.1 and 0.4 grams/liter of lead?
- (b) What is the probability that a random liter of gasoline will contain more than 0.3 grams/liter of lead?
- (c) Give the cumulative probability function  $F_Y(y)$ . (Hint: you need to discuss the value of  $y$  for three cases:  $y \leq 0.1$ ,  $0.1 < y < 0.5$ ,  $Y \geq 0.5$ ).
- (d) Use the cumulative probability function  $F_Y(y)$  to calculate the probability that a random liter of gasoline will contain less than 0.35 grams of lead.
- (e) Calculate the expected value of  $Y$ .
- (f) Calculate the variance for  $Y$ .

### Question 02

Suppose the weight, say,  $Y$ , in pounds of a certain packaged chemical is uniform from 48 to 50 pounds. That is the pdf is of the form

$$f_Y(y) = \frac{1}{2}; \quad 48 \leq y \leq 50.$$

- (a) What is the mean weight of the chemical?
- (b) What is the probability that a randomly chosen package of chemical will weigh between 48.5 and 49.4 pounds?
- (c) In the long run, what proportion of packages will weigh more than 49.2 pounds?