

Homework 5, ISyE 2027 Spring 2006

Due on Monday, February 27

Problem 1 Hayter, Problem 2.3.6

Problem 2 Hayter, Problem 2.3.10

Problem 3 Let X be a discrete random variable, where $P(X = k) = k/21$, for $k = 1, 2, 3, 4, 5, 6$.

- Calculate $E[\min(X, 3)]$.
- Find all of the medians of X .
- Calculate $Var(3X - 4)$.
- Find the 40th quantile of X .

Problem 4 The total number of students (in all sections) taking ISyE 2027 in a given semester has a mean of 150 and a standard deviation of 25. Provide a lower bound that is strictly greater than 0 on the probability that the total number of students taking ISyE 2027 is between 100 and 200.

Problem 5 Suppose X is a continuous random variable with cumulative distribution function

$$F(t) = \begin{cases} 0, & t < 0; \\ t^2/16, & 0 \leq t < 4; \\ 1, & t \geq 4. \end{cases}$$

- What is the variance of this random variable?
- What is the standard deviation of this random variable?
- Calculate the 75th quantile of this random variable.
- Calculate the 25th quantile of this random variable.

Problem 6 Suppose X is a Bernoulli random variable with parameter p (recall that a Bernoulli random variable is just a Binomial random variable with parameters $n = 1$, and p).

- Describe the cumulative distribution function of X .
- Suppose $p = 1/2$. Find all of the medians of X .
- Now suppose that X is Bernoulli with parameter $p < 1/2$. Find all of the medians of X . If there is only one median, is the mean of X equal to the median?

Problem 7 Hayter, Problem 3.1.6