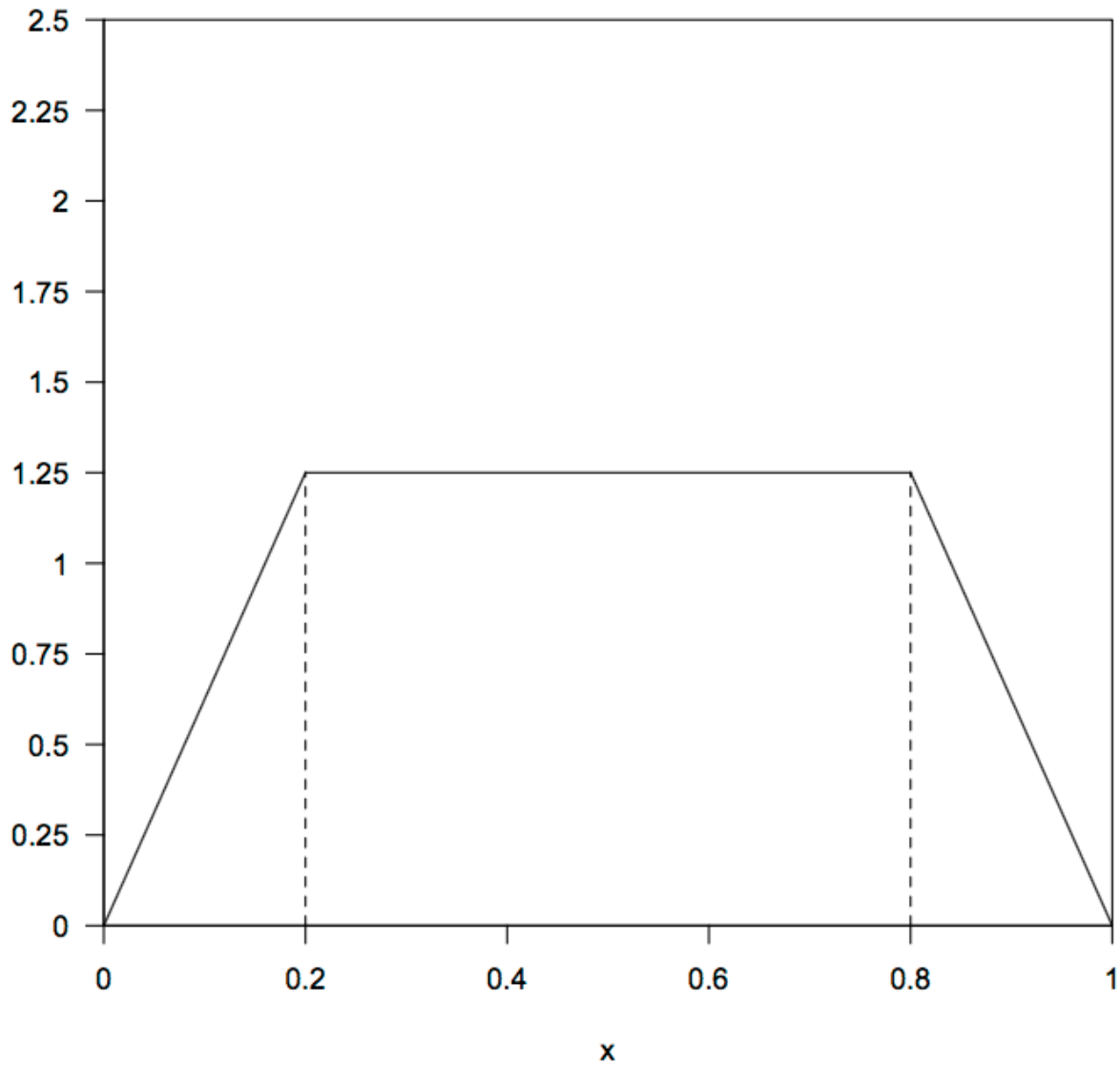


Information

The density curve pictured below applies to Questions 1 to 5.

(Hint: the dashed lines are drawn to help you see that the region under the density curve can be split up into triangles and a rectangle.)



Question 1 (1 point)

Use the two properties of density curves to verify that the above figure is a valid density curve. Show your work.

Question 2 (1 point)

What proportion of values of X are between 0.2 and 0.8?

Question 3 (1 point)

What proportion of values of X are less than 0.6?

Question 4 (1 point)

Use your answer to Question 3 to determine the proportion of values of X that are at least 0.6.

Question 5 (1 point)

What is the value of x such that $P(0.2 < X < x) = 0.5$?

Question 6 (1 point)

The time to complete a statistics exam is approximately normally distributed. One hundred students write the exam. John completes the exam in 90 minutes, one standard deviation faster than the mean completion time. Use the 68-95-99.7% rule to determine the approximate number of students who take longer to complete the exam.

Hint: If John's completion time is faster than the mean, that means his completion time is **less** than the mean.

Question 7 (1 point)

A variable Z has a standard normal distribution. Find the value z such that

$$P(-0.88 < Z < z) = 0.7977$$

Question 8 (1 point)

A variable Z has a standard normal distribution. Find the value z such that

$$P(Z > z) = 0.0537$$

Information

The following applies to Questions 9 to 11.

The time to complete a math exam is approximately normally distributed with a mean of 105 minutes and a standard deviation of 10 minutes.

Question 9 (1 point)

What proportion of students take between 90 and 110 minutes to complete the exam?

Give your answer to 4 decimal places.

Question 10 (1 point)

The fastest 10% of students take no more than how many minutes to complete the exam?

Give your answer to 1 decimal place.

Question 11 (1 point)

What is the 65th percentile of completion times?

Give your answer to 1 decimal place.

Question 12 (1 point)

Weights of hockey players in a certain league follow a normal distribution with mean 194 pounds. It is known that 22.66% of players weigh more than 200 pounds.

What is the standard deviation of the weights of hockey players in the league?

Question 13 (1 point)

Speeds of vehicles going through an intersection follow a normal distribution with standard deviation 8 km/h. It is known that 3.75% of vehicles are going faster than 85 km/h.

What is the mean speed of vehicles going through the intersection?

Give your answer to 2 decimal places.

Question 14 (4 points)

An experiment is to be conducted to determine the effect of a new medication in reducing fever. The researcher believes the effect of the drug depends on the frequency of taking the drug (once per day, twice per day, or four times per day) and the dose (325 mg, 500 mg, or 650 mg). There are 45 people available for the experiment and each treatment is assigned to the same number of individuals. The decrease in fever symptoms will be measured by comparing the change in body temperature for all the subjects.

- (a) Identify the factors in this experiment.
- (b) Identify the treatments in this experiment.
- (c) Determine the number of experimental units to be allocated to each treatment.
- (d) Is there a blocking variable in this experiment? If so, what is it?

Question 15 (3 points)

An experiment is to be conducted to determine the effect of type of engine analyzer on the time needed to complete a minor engine tune-up. A computerized engine analyzer or an electronic analyzer will be used. The experiment will be conducted separately for three sizes of cars (compact, intermediate, and full-sized), as the effect of type of engine analyzer used is expected to differ for the three car sizes. There are 10 compact cars, 10 intermediate cars, and 10 full-sized cars available for the experiment.

- (a) Identify the factors and factor levels in this experiment.
- (b) Identify the treatments in this experiment.
- (c) Is there a blocking variable in this experiment? If so, what is it?