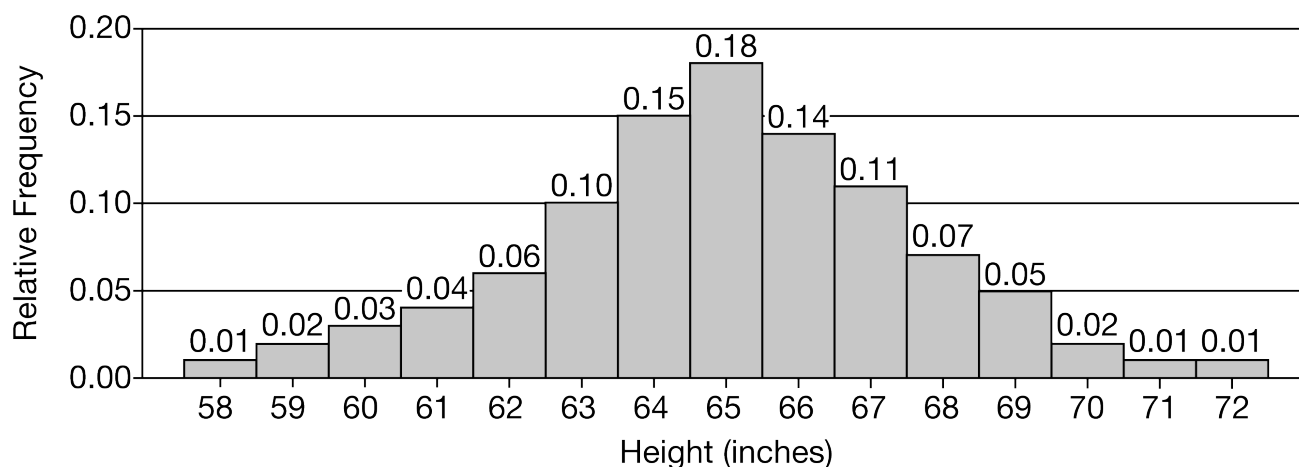


The Normal Distribution, Revisited Quiz

1. Show all your work. Indicate clearly the methods you use, because you will be scored on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.

The following histogram shows the relative frequencies of the heights, recorded to the nearest inch, of a population of women. The mean of the population is 64.97 inches, and the standard deviation is 2.66 inches.



One woman from the population will be selected at random.

- (a) Based on the histogram, what is the probability that the selected woman will have a height of at least 67 inches? Show your work.
- (b) What is the area of the bar corresponding to a height of 67 inches in the graph, and what does the area represent in terms of probability?
- (c) The histogram displays a discrete probability model for height. However, height is often considered a continuous variable that follows a normal model. Consider a normal model that uses the mean and standard deviation of the population of women as its parameters.
 - (i) Use the normal model and the relationship between area and relative frequency to find the probability that the randomly selected woman will have a height of at least 67 inches. Show your work.
 - (ii) Does your answer in part (c-i) match your answer in part (a)? If not, give a reason for why the answers might be different.
- (d) Let the random variable H represent the height of a woman in the population. $P(H < 60)$ represents the probability of randomly selecting a woman with height less than 60 inches. Based on the information given, the probability can be found using either the discrete model or the normal model.
 - (i) Give an example of a probability of H that can be found using the discrete model but not the normal model. Explain why.
 - (ii) Give an example of a probability of H that can be found using the normal model but not the discrete model.

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Explain why.

2. The mean and standard deviation of the sample data collected on continuous variable x are -0.25 and 0.03 , respectively. The following table shows the relative frequencies of the data in the given intervals.

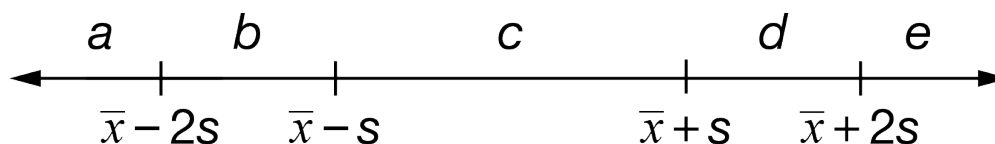
Interval	Relative Frequency
$-0.34 \leq x < -0.31$	0.02
$-0.31 \leq x < -0.28$	0.15
$-0.28 \leq x < -0.25$	0.33
$-0.25 \leq x < -0.22$	0.36
$-0.22 \leq x < -0.19$	0.11
$-0.19 \leq x < -0.16$	0.03

Based on the table, do the data support the use of a normal model to approximate population characteristics?

- (A) Yes, because the sum of the relative frequencies is 1.00.
- (B) Yes, because the distribution of relative frequencies is very close to the empirical rule for normal models.
- (C) No, because the values are negative and normal models are used for positive values.
- (D) No, because the distribution of relative frequencies is very far from the empirical rule for normal models.
- (E) No, because the sample size and the population parameters are not known.
3. The continuous random variable N has a normal distribution with mean 7.5 and standard deviation 2.5. For which of the following is the probability equal to 0 ?
- (A) $P(N = 8)$
- (B) $P(N > 8)$
- (C) $P(N < 8)$
- (D) $P(7 < N < 8)$
- (E) $P(N < 7)$ or $P(N > 8)$
4. Data will be collected on the following variables. Which variable is most likely to be approximated by a normal model?

The Normal Distribution, Revisited Quiz

- (A) The distribution of the number of books read last week by middle school students, where the right tail of the distribution is longer than the left
- (B) The distribution of life span, in minutes, for batteries of a certain size, where most life spans cluster around the center of the distribution but with some very low and some very high life spans
- (C) The distribution of ages, in years, of the students at a certain college, where most students are between 18 and 22 years old, but ages greater than 22 will probably be more spread out than ages less than 18
- (D) The distribution of the number of birthdays per month for the employees at a certain company, where the number of birthdays in each month is approximately equal
- (E) The distribution of the length of a stay, in days, in a hospital after surgery, where many patients have very short hospital stays, but some stays are quite lengthy and considered high outliers
5. Clara recorded 50 numerical observations on a certain variable and then calculated the mean \bar{x} and the standard deviation s for the observations. To help decide whether a normal model is appropriate, she created the following chart.



- In Clara's chart, the letters a , b , c , d , and e represent the number of observations falling in each interval. Which of the following list of counts for a , b , c , d , and e , respectively, is the best indicator that the variable can be modeled with a normal approximation?
- (A) 1, 7, 34, 7, 1
- (B) 1, 10, 28, 10, 1
- (C) 2, 8, 30, 8, 2
- (D) 2, 4, 38, 4, 2
- (E) 5, 5, 30, 5, 5
6. The distribution of time needed to complete a certain programming task is approximately normal, with mean 47 minutes and standard deviation 6 minutes. Which of the following is closest to the probability that a randomly chosen task will take less than 34 minutes or more than 60 minutes to complete?
- (A) 0.0151
- (B) 0.0303
- (C) 0.4849
- (D) 0.9697
- (E) 0.9849
7. A machine is used to fill bags with a popular brand of trail mix. The machine is calibrated so the distribution of the weights of the bags of trail mix is normal, with mean 240 grams and standard deviation 3 grams. Of the following, which is the least weight of a bag in the top 5 percent of the distribution?

The Normal Distribution, Revisited Quiz

- (A) 234 grams
- (B) 240 grams
- (C) 243 grams
- (D) 246 grams
- (E) 248 grams