

Normal Distributions Problems

1. A study of elite distance runners found a mean body weight of 63.1 kilograms (kg), with a standard deviation of 4.8 kg.
 - (a) Assuming that the distribution of weights is Normal, make an accurate sketch of the weight distribution showing three standard deviations on either side of the mean.

 - (b) Use the 68–95–99.7 rule to find the proportion of runners whose body weight is between 48.7 and 67.9 kg. Show your method.

 - (c) Calculate and interpret the 45th percentile of the runners' body weight distribution.

2. Use Table A or your calculator to find the proportion of observations from a standard Normal distribution that satisfies $-1.51 < Z < 0.84$. Sketch the Normal curve and shade the area under the curve that is the answer to the question.

3. Give an example of a quantitative variable that does not have a Normal distribution. Justify your answer.

4. The length of human pregnancies from conception to birth varies according to a distribution that is approximately Normal with mean 266 days and standard deviation 16 days. Use the 68–95–99.7 rule to answer the following questions. **Show your work.**
 - (a) How short are the shortest 2.5% of all pregnancies?

 - (b) What percent of pregnancies last between 250 and 298 days?

5. The scores of a reference population on the Wechsler Intelligence Scale for Children (WISC) are Normally distributed with $\mu = 100$ and $s = 15$.
- (a) What score would represent the 50th percentile? Explain.
- (b) What score would place a student in the top 1% of the scores? Show your method.
6. In 1945 after WWII, all servicemen were given point scores based on length of service, number of purple hearts, number of campaigns, etc. Assuming that the distribution is $N(63, 20)$, how many men from an army of 8,000,000 would be discharged if the army discharged all men with more than 79 points?
7. Wechsler Adult Intelligence Scale (WAIS) scores for young adults are $N(110, 25)$.
- (a) If someone's score were reported as the 16th percentile, about what score would that individual have?
- (b) Answer the same question for the 97.5th percentile.
8. Use Table A or your calculator to find the proportion of observations from a standard Normal distribution for which $-2 < Z < 1.67$. Sketch a standard Normal curve, shade the area representing the proportion, and show your method of calculating the proportion.
9. The distribution of heights of adult American men is approximately Normal with mean 69 inches and standard deviation 2.5 inches. How tall must a man be to be in the tallest 10% of all adult men? Show your method.