

MDM4U: Properties of the Normal Distribution

- Which scenarios might be expected to follow a normal distribution?
 - the heights of students in a kindergarten classroom
 - the masses of bags of coffee, labelled as 454 g
 - the ages of runners in a marathon
- For each normal distribution, determine the range of values that fall within one, two and three standard deviations from the mean.
 - $\mu=80, \sigma=5$
 - $\mu=172, \sigma=8$
 - $\mu=32.4, \sigma=1.8$
- For each normal distribution, determine the range of values that make up the specified central percentage of the data.
 - $\mu=120, \sigma=14, 68\%$
 - $\mu=315, \sigma=7.5, 95\%$
 - $\mu=27, \sigma=0.6, 99.7\%$
- A datum is one standard deviation above the mean in a normal distribution. What percentage of data are below this datum?
- A datum is two standard deviations below the mean in a normal distribution. What percentage of data are below this datum?
- A datum located two standard deviations above the mean in a normal distribution has a value of 185. If the mean is 178, what is the value of the standard deviation?
- A datum located three standard deviations below the mean in a normal distribution has a value of 91. If the standard deviation is 11, what is the value of the mean?
- For each normal distribution, determine the z-score of the specified datum, x .
 - $\mu=15, \sigma=3, x=24$
 - $\mu=87, \sigma=9, x=69$
 - $\mu=11.6, \sigma=1.7, x=15$
- For each normal distribution, determine the value of the datum, x , with the specified z-score.
 - $\mu=23, \sigma=7, z=2$
 - $\mu=54, \sigma=5, z=-1$
 - $\mu=27.8, \sigma=1.2, z=0$
- A glue manufacturer knows that the mean drying time of a new glue is 45 min, with a standard deviation of 4 min. What range of times accounts for the central 95% of all drying times?
- A breed of adult dog has a mean mass of 14 kg and a standard deviation of 2 kg. A breeder claims that roughly two thirds of such dogs have a mass between 12 and 16 kg. Is this claim correct?
- The heights of sunflowers are normally distributed, with a mean of 3.6 m and a standard deviation of 0.3 m. In a sample of 50 sunflowers, 32 are 3.3 m or taller. Is this sample representative?

Solutions

1. a and b 2a. 75-85, 70-90, 65-95 b. 164-180, 156-188, 148-196 c. 30.6-34.2, 28.8-36, 27-37.8
3a. 106-134 b. 300-330 c. 25.2-28.8 4. 84% 5. 2.5% 6. 3.5 7. 124 8a. 3 b. -2 c. 2
9a. 37 b. 49 c. 27.8 10. 37-53 min 11. yes 12. no