



Z - Scores

Each of the questions included here can be solved using either the TI-nspire CX or CX CAS.

Scan the QR code or use the link: <http://bit.ly/z-scores>

Question: 1.

John scored 33 out of 50 in a statewide mathematics exam. Student scores are normally distributed with an average of 30 and standard deviation of 8. What was John's standardised score?



Question: 2.

Lizzie scored 15 out of 20 shots from the free throw line in basketball. If the National average is 13 with a standard deviation of 3, determine Lizzie's standardised score.

Question: 3.

Jessie owns a \$950,000 house in a major capital city. The house prices in her current city are normally distributed with an average of \$855,000 and standard deviation of \$90,000. Jessie plans to move to another city where the average house price is \$790,000 and a standard deviation of \$60,000. She wants to move into a comparable price bracket and is currently considering three houses: (a) \$780,000. (b) \$835,000. (c) \$855,000. (d) \$885,000. Which of the four houses is closest in comparison?

Question: 4.

Dani visits the Royal Children's Hospital for a check up on her 2 year old son. The hospital uses a growth chart and notes that Dani's little boy is in the 97% percentile corresponding to a z-score of approximately 2. If the mean height of two year old boys is 87cm with a standard deviation of 3cms, what is the height of Dani's boy?

Question: 5.

John is 190cm tall. The average male height is normally distributed with a mean of 175cm and a standard deviation of 7.4cm. Jenny is 178cm tall. The mean height of women is 161cm with a standard deviation of 6.9cm. Which person is 'statistically' taller, John or Jenny?

Answers

Question 1

$$\text{z-score: } \frac{x - \mu}{\sigma} = \frac{33 - 30}{8} = \frac{3}{8}$$

Question 2

$$\text{z-score: } \frac{x - \mu}{\sigma} = \frac{15 - 13}{3} = \frac{2}{3}$$

Question 3

$$\text{Jessie's current z score: } = \frac{x - \mu}{\sigma} = \frac{950,000 - 855,000}{90,000} = 1.055\dots$$

One approach would be to apply this z-score to the new city. $1.055\dots = \frac{x - 790,000}{60,000}$ which means $x = 853,333$

This means option (c) would be the most comparable.

Another approach to the problem is to determine each of the z-scores for the new distribution:

Option (a) is definitely wrong as it is below the average of the new city.

Option (b) has a z score of 0.75

Option (c) has a z score of 1.083 [Closest z score]

Option (d) has a z score of 1.58

Question 4

$$\text{z-score: } \frac{x - \mu}{\sigma} = \frac{x - 87}{3} = 2 \text{ which means Danni's little boy is not so little at 93cm.}$$

Question 5

$$\text{John's z-score: } \frac{x - \mu}{\sigma} = \frac{190 - 175}{7.4} \approx 2.027$$

$$\text{Jenny's z-score: } \frac{x - \mu}{\sigma} = \frac{178 - 161}{6.9} \approx 2.46$$

This means that statistically speaking, Jenny is taller. She is a greater number of standard deviations from the mean than John.