Statistics Unit 1 quiz 4: Shifting and rescaling a data set, z-scores and the empirical rule

Name _____ Date _____ Period _____

8 questions, 22 points

1. Every value in a data set with standard deviation 4 is multiplied by 3, and then 7 is subtracted. Kofi says the new variance is $3 \times 16 - 7 = 41$. (2 points)

(a) Find the correct new standard deviation and variance.

(b) Name both of Kofi's mistakes.

2. The times that seeds of one pepper variety take to sprout in a greenhouse are modeled by $N(9, 1.5)$, in days. Use the empirical rule: for a normal model, about 68%, 95% and 99.7% of values lie within one, two and three standard deviations of the mean. (2 points)

(a) Estimate the share of seeds that take longer than 6 days to sprout.

(b) Estimate the share of seeds that sprout in between 4.5 and 7.5 days.

3. School groups book seats at a play. Each ticket costs 10 dollars, and each group also pays one booking fee of 4 dollars. The group sizes had mean 12 students, median 10 students, standard deviation 5 students and IQR 6 students. Find the mean, median, standard deviation and IQR of the amounts, in dollars, that the groups paid. (3 points)

4. A teacher curved the scores on a hard test by the rule $y = 0.8x + 20$, where x is the original score. After the curve, the scores had mean 76, median 80 and standard deviation 8. Find the original mean, median and standard deviation. (3 points)

Free sample from math.wiki for classroom use. Do not post. math.wiki

5. A video game turns each player's raw points x into a rating $y = a + bx$, with $b > 0$, the same rule for every player. The raw points had $Q_1 = 20$, median 25, $Q_3 = 32$ and standard deviation 9. The ratings had $Q_1 = 50$ and $Q_3 = 74$. Find a and b, the median rating and the standard deviation of the ratings. (3 points)

6. A power company writes to every home whose monthly electricity use has a z-score above 1.5, to offer a free energy check. Monthly use among its homes has mean 660 kWh (kilowatt-hours) and standard deviation 160 kWh. (3 points)

   (a) Above what monthly use does a home get a letter?

   (b) One home used 860 kWh last month. Find its z-score and say whether it gets a letter.

7. At a county track meet, Sofia enters the long jump and the 100 m sprint. The long jumps at the meet have mean 5.20 m and standard deviation 0.30 m, and Sofia jumps 5.83 m. The sprint times have mean 13.4 seconds and standard deviation 0.5 seconds, and Sofia runs 12.4 seconds. In which event did she do better, compared with the other competitors? Show the z-scores. (3 points)

8. The daily step counts that members of a walking club log on their fitness trackers have a distribution in which 7,200 steps has z-score 0.5 and 10,400 steps has z-score 2.5. Find the mean and the standard deviation of the daily step counts. (3 points)

Free sample from math.wiki for classroom use. Do not post. math.wiki