Statistics Unit 1 worksheet: Shifting and rescaling a data set

Name _____ Date _____ Period _____

1. Each cell gives one summary of a data set x and the rule applied to every value. Find the summary asked for after the rule.

(a) $\bar{x} = 14$, $y = x + 9$; find $\bar{y}$

(b) $\sigma_x = 3.5$, $y = x - 20$; find σ_y

(c) median 8, $y = 5x$; find the new median

(d) $\sigma_x^2 = 4$, $y = 3x$; find σ_y^2

(e) IQR 10, $y = 2x + 7$; find the new IQR

(f) $Q_1 = 6$, $y = 0.5x + 4$; find the new Q_1

(g) $\sigma_x = 1.5$, $y = 4x - 3$; find σ_y

(h) $\sigma_x^2 = 2.25$, $y = 2x + 1$; find σ_y

2. A hiking trail has signposts along the way. Measured from the trailhead, the signposts stand at heights with mean 265 m, median 260 m, standard deviation 44 m and IQR 80 m. The trailhead itself is 900 m above sea level. Give the same four summaries for the signposts' heights above sea level.

3. Two farms weighed their watermelons. Farm A reports in pounds: mean 18 lb, standard deviation 3.3 lb. Farm B reports in kilograms: mean 7.5 kg, standard deviation 1.4 kg. Use 1 kg = 2.2 lb.

(a) Give Farm B's mean and standard deviation in pounds.

(b) Which farm's watermelons are heavier on average, and which farm's weights vary more?

4. A printer needs 15 seconds to warm up for each print job and then 4 seconds for each page. One day its jobs had a mean of 12 pages, a median of 9 pages and a standard deviation of 5 pages.

(a) Write the time y, in seconds, for a job of x pages.

(b) Find the mean, median, standard deviation and variance of the job times.

(c) Explain why the 15 seconds of warm-up plays no part in the standard deviation.

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5. A tutoring center sent four families bills of 30, 35, 45 and 50 dollars. It then added a 5 dollar fee to every bill under 40 dollars and nothing to the others.

   (a) Find the mean and the range of the bills before and after the fee.

   (b) Explain why the new mean is not the old mean plus 5, and why the range changed.

6. Samir gave a quiz marked out of 20 points. To put the scores out of 100, every score is multiplied by 5, and then everyone gets 5 bonus points. Before the change the scores had mean 14, median 12, standard deviation 3 and IQR 3 points. Find the new mean, median, standard deviation, variance and IQR.

7. Malik says that every score on a test was changed by one rule $y = a + bx$ with $b > 0$. Before the change the scores had mean 40, standard deviation 5 and IQR 8. After it they had mean 70, standard deviation 10 and IQR 12.

   (a) Could Malik be right? Explain.

   (b) Suppose the IQR after the change had been 16 instead. Find a and b.

8. Five bags of flour are weighed, in grams: 1003, 1007, 1008, 1010, 1012. Subtract 1000 from every weight first, and use the smaller numbers to find the mean and the population standard deviation of the five weights. Round the standard deviation to two decimal places.

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