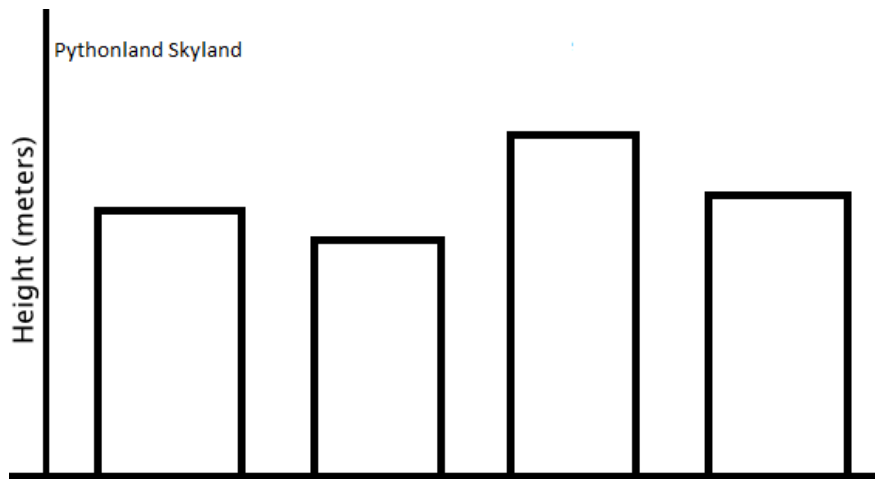Help

L4 PROBLEM 4 (4/4 points)

The *coefficient of variation* is the standard deviation divided by the mean. Loosely, it's a measure of how variable the population is in relation to the mean.

1. Figure 1 shows the skyline of Pythonland, and Figure 2 shows the skyline of Montyland.

Pythonland Skyland — Height (meters)

Montyland Skyline — Height (meters)

Considering the heights of buildings in Pythonland and Montyland, which has a larger coefficient of variation?

- ◯ Pythonland
- ◉ Montyland ✔

EXPLANATION:

Both have the same standard deviation (the heights are just shifted, which means the means are different, but the standard deviation is the same).

Montyland's buildings are short, but Pythonland's buildings are tall. So the coefficient of variation for Pythonland and Montyland have the same numerator, but a large denominator for Pythonland, and a small one for Montyland. That makes Montyland's coefficient of variation larger.

2. Which of the following populations has the highest coefficient of variation?

    ◉ [1, 2, 3] ✔️

    ◯ [11, 12, 13]

    ◯ [0.1, 0.1, 0.1]

EXPLANATION:

Both A and B have the same standard deviation, but B has a larger mean. So, A has a higher coefficient of variation. Despite having the smallest mean, C has a standard deviation of 0, and so its coefficient of variation is 0 as well.

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3. For each of the following choices, indicate where computing the Coefficient of Variation would be invalid.

    ☑ Daily Temperature in Celsius for the city of Boston ✔️

    ☐ Heights of children

    ☐ Number of lines of code in each function in all problem sets for 6.00.2x

    ☑ The X coordinate of a drunk in the random walk ✔️

    ☐ The distance a drunk ended up away from the starting point in the random walk

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EXPLANATION:

A and D are the correct choices.

Coefficient of Variation should only be computed on ratio scales (i.e., data where there is a "true" zero, like temperatures in Kelvin, or heights, or sizes of populations, etc). Coefficient of Variation may not be meaningful for data that does not have a "true" zero.

Temperatures measured in Celsius is not a ratio scale, and does not have a "true" zero since may have positive and negative values. Thus, computing the CoV for the daily temperature in Celsius for the city of Boston would be invalid.

The X coordinate (and Y coordinate) of a drunk in the random walk are also not ratio scales because there isn't a "true" zero. In addition, we know that the X (and Y) coordinate have a mean position of 0. That means that the denominator of the Coefficient of Variation is zero, so it can not be computed.

The fifth answer choice - "The distance a drunk ended up away from the starting point in the random walk" - does not have a mean of 0 because distance is always positive. If this was written in a way like: "The number of units a drunk ended up away from the starting point in the random walk, where a unit is positive if a drunk moves North or East and negative if a drunk moves South or West", then the mean could possibly be zero.

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4. Compute the coefficient of variation of [10, 4, 12, 15, 20, 5] to 3 decimal places.

    `0.503`   **Answer:** .503

[Check]   [Hide Answer]

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