1.

Set	Values			
1	1	5	7	9
2	-20	-10	0	10
3	100	101	102	103
4	-10	-5	0	-5

Consider the four sets of samples above. Which one has the smallest **variance?**

○ 1

○ 2

◉ 3

○ 4

⊘ **Correct**
The variance measures how much a sample is spread. We can easily look at all the samples and check that this one has the smallest spread.

2. Consider two games, Game A and Game B, each with different probability distributions of winnings and losses. Game A has a probability of $\frac{1}{3}$ to win \$2 and a probability of $\frac{2}{3}$ to lose \$1. Game B has a probability of $\frac{1}{2}$ to win \$0.50, a probability of $\frac{1}{4}$ to lose \$0.50, a probability of $\frac{1}{8}$ to win \$5, and a probability of $\frac{1}{8}$ to lose \$2.

Which of the following statements is **true?**

○ Both Game A and Game B have the same kurtosis.

○ Game B's kurtosis is smaller than Game A's kurtosis.

◉ Game A's kurtosis is smaller than Game B's kurtosis.

⊘ **Correct**
Kurtosis measures the shape and thickness of the rails of a probability distribution. A larger kurtosis indicates thicker tails and more extreme values. In this case, Game Y has a larger kurtosis because it has thicker tails due to the presence of extreme values (winning \$5 or losing \$2 with small probabilities).
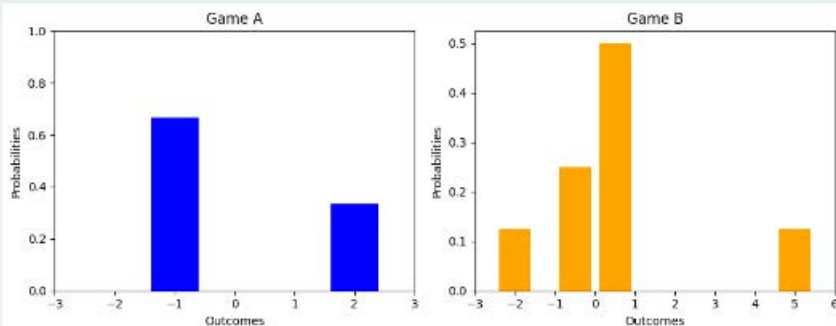
3. Consider the following **independent** random variables:

$$X \sim \text{Normal}(3, 1)$$
$$Y \sim \text{Normal}(2, 2)$$

Then $Z = X + Y \sim \text{Normal}(\mu, \sigma)$, where μ, σ are equal to:

- ○ $\mu = \sqrt{5}, \sigma = \sqrt{3}$

- ◉ $\mu = 5, \sigma = \sqrt{5}$
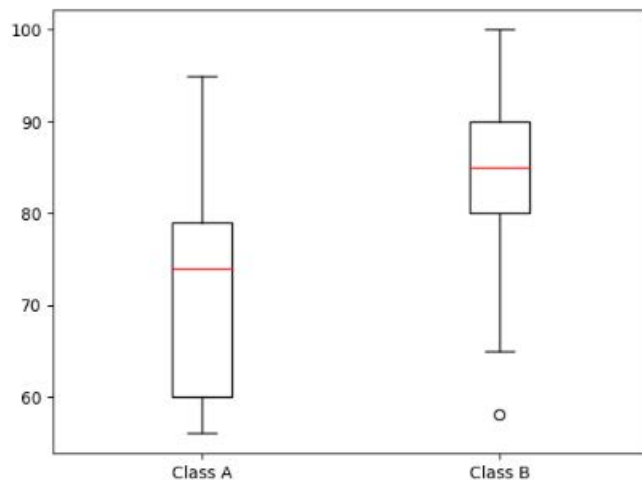
- ○ $\mu = 5, \sigma = \sqrt{3}$

- ○ $\mu = 5, \sigma = 5$

⊘ Correct

Using the formula $\mu_Z = \mu_X + \mu_Y$ and $\sigma_Z = \sqrt{\sigma_X^2 + \sigma_Y^2}$ you get the result!

4. Consider the following box plot for the test scores of two classes, A and B:

Which of the following statements is true?

- ☐ Class B's interquartile range (IQR) is larger than Class A's interquartile range.
- ☐ Class A's median score is higher than Class B's median score.

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> ⊘ **Correct**
> Looking at the box plot, we can see that the median of Class A is around 75, while the median of Class B is around 85.
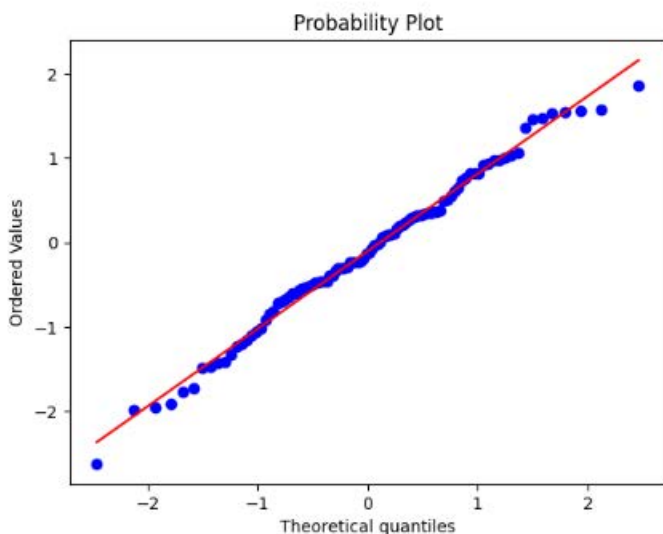
☑ Class A's interquartile range (IQR) is larger than Class B's interquartile range.

> ⊘ **Correct**
> The rectangle in A is bigger than B.

5. Consider the following QQ plot for a set of data:

Which of the following statements is true?

◉ The data looks normally distributed.

◯ The data has a higher variance than a normal distribution.

◯ The data has a lower variance than a normal distribution.

◯ The data is not normally distributed.

> ⊘ **Correct**
> The QQ plot compares the observed data with the theoretical quantiles of a normal distribution. If the points lie close to the diagonal line, then the data is likely normally distributed.