**Q1 Means and Sampling**
2 Points

\( \bar{X} \) and \( \mu \) are both terms that come up in sampling and statistics.

**Q1.1 Definitions**
1 Point

Which of the following statements correctly define \( \bar{X} \) and \( \mu \) in the context of sampling from a distribution in statistics?

- They are different notations for the same quantity (the population mean)
- They are different notations for the same quantity (the sample mean)
- \( \mu \) is the population mean and \( \bar{X} \) is the sample mean
- \( \mu \) is the sample mean and \( \bar{X} \) is the population mean

**Q1.2 Randomness**
1 Point

Sampling implicitly introduces randomness when drawing from a distribution. How do we describe the randomness of \( \bar{X} \) and \( \mu \)?

- Only \( \bar{X} \) is a random variable
- Only \( \mu \) is a random variable
- Both quantities are random variables

**Q2 Central Limit Theorem**
2 Points

The Central Limit Theorem (CLT) is one of the seminal results in statistics. From the definition of the CLT, which of the following statements follow (choose all):

- \( \text{Var}(\bar{X}) \) the variance of the sample mean, is inversely proportional to the size of the sample
- \( \text{Var}(\bar{X}) \), the variance of the sample mean, grows linearly with the size of the sample
- \( \bar{X} \), the sample mean, grows linearly with the size of the sample
- The population mean \( \mu \) drawn, from any type of distribution is distributed, normally
- \( \bar{X} \), the mean of a sample drawn i.i.d. from any type of distribution, is distributed normally
- \( \sum X_i \), the sum of a sample drawn i.i.d. from any type of distribution, is distributed normally

**Q3 Bootstrapping**
1 Point

Bootstrapping relies on the following intuition

- Your population distribution can generally always be approximated as a normal
- Your sample distribution is generally normal
- Your sample distribution approximates your population distribution.