Week 5: Discussion

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Hand back exams, labs, and homework ::

Exam Questions ::

Means, samples, and standard deviation :: Time permitting, properties of samples will be considered (which is a major topic that will be explored before the next exam).

Suppose we sample a bunch of numbers from a normal distribution with mean μ and standard deviation σ. Then, what are the properties of the mean?

- The expected value of the mean is μ.
- The mean, since it is an average of many random numbers, will likely be closer to μ than one of the random numbers. That is, compare your sample mean to one random number from the normal distribution – most of the time, the mean will be closer to μ (the 'randomness in the mean' is smaller than the randomness in a single random number).
- The sample mean will actually be distributed normally with a mean μ and a standard deviation $\sigma/\sqrt{n}$.
- If the sample size is large (say, it is made to be greater than 50), then even if the sample is not from a normal but from another distribution with mean μ and standard deviation σ, then the mean will still be sampled from a distribution very close to a normal distribution with mean μ and standard deviation $\sigma/\sqrt{n}$ (this is the Central Limit Theorem). The bottom line is, we can use the normal approximation (and Z-score) when the sample size is sufficiently large. More precise conditions for when we can safely use this approximation will be discussed as the course goes on.