

MTH 1210 Exam III Topics The exam covers the material on Slides 13-18, Homeworks 7 and 8, and Sections 7.1-7.3, 8.1-8.3, 9.1, 9.3-9.5, and 12.1 in the book. Exam problems will be similar to examples and exercises done in class, homework problems, and sample exam problems.

Statistics and population parameters: know the difference.

Sampling distributions of statistics:

Know that the sampling distribution of a statistic indicates which values the statistic might take and the probabilities of those values (i.e. it's the probability distribution of the statistic).

Standard error: know that it's another name for the std dev of the sampling distribution of a statistic, and represents a typical sampling error size.

Sampling distribution of the sample mean \bar{x} : Know each of the following:

The mean $\mu_{\bar{x}}$ and std dev (std error) $\sigma_{\bar{x}}$ of the sampling distribution of \bar{x} are

$$\mu_{\bar{x}} = \mu \quad \text{and} \quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}.$$

If the sample is from a normal population, then the sampling distribution of \bar{x} will be normal.

According to the Central Limit Theorem (CLT), even if the sample is from a non-normal population, the sampling distribution of \bar{x} will be (approximately) normal as long as the sample size n is large.

Know how to find probabilities involving \bar{x} , by finding the z-score for an \bar{x} value and using the standard normal table (Table II).

Know how to find percentiles involving \bar{x} by obtaining the z-score from the standard normal table (Table II) and "unstandardizing" it.

Point estimation:

Know the estimators of the population parameters μ , σ , and p (i.e. \bar{x} , s , and \hat{p}).

Sampling error: know that it's the difference between an estimate and the true value.

Confidence Intervals:

General properties of CIs:

Level of confidence: know how to interpret it, i.e. it's the degree to which we can be confident that the interval contains μ (or p).

Margin of error: know how to interpret it, i.e. it measures the precision of the estimate of μ (or p).

Know how the sample size n affects the width of a CI.

Know how the level of confidence affects the width of a CI.

One-mean z confidence interval for an unknown population mean μ :

Know when to use it (i.e. when you know the population standard deviation σ).

Know how to **compute** it.

Know how to **interpret** it (i.e. it gives a set of plausible values for μ).

One-mean t confidence interval for an unknown population mean μ :

Know when to use it (i.e. when you don't know the population standard deviation σ).

Know how to **compute** it.

Know how to **interpret** it (i.e. it gives a set of plausible values for μ).

Sample size calculation in a CI for μ : know how to determine how big n needs to be to attain a desired margin of error E when either σ is known or you have a guess for the value of σ .

Sample proportion \hat{p} : know what it is and how to compute it.

One-proportion z confidence interval for an unknown population proportion p :

Know when to use it (i.e. when you have sample from a population of "successes" and "failures" and n is large).

Know how to **compute** it.

Know how to **interpret** it (i.e. it gives a set of plausible values for p).

Hypothesis Tests:

General topics related to hypothesis testing:

Population parameter of interest: know how to identify what μ represents from the statement of a problem.

Null and alternative hypotheses: know the difference, and know how to decide what the hypotheses are for a given problem.

Test statistic: know how to compute it (for each of the tests below) and how it's used to find the p-value (for each of the tests below).

Level of significance α : know what it's used for.

P-value: know how to find it (for each of the tests below), how to interpret it, and how it's used to decide whether to reject or fail to reject H_0 .

Statistical significance: know what this means.

One-mean z test for a population mean μ :

Know when to use it (i.e. when you know the population standard deviation σ).

Know how carry out the test by following the **six steps** given in **Slides 17**.

One-mean t test for a population mean μ :

Know when to use it (i.e. when you don't know the population standard deviation σ).

Know how carry out the test by following the **six steps** given in **Slides 17**.

THE FOLLOWING TOPIC IS *NOT* COVERED ON THE EXAM (WE SKIPPED IT)

Sample size calculation in a CI for p : know how to determine how big n needs to be to attain a desired margin of error E when either you have a guess \hat{p}_g for the value of \hat{p} or you don't have a guess so you use $\hat{p}_g = 0.5$ instead.