Learning Outcomes – MATH 10041 – Chapter 9

Ch.	Sec.	Big idea	Learning outcomes – Conceptual	Learning Outcomes - Observable
9	1	Sample Means of Random Samples	Understand bias and precision of an estimator; A population parameter is fixed, but sample statistics vary from sample to sample; There are three levels of data involved in taking random samples: the population, the individual samples, and the distribution of sample statistics; Sample statistics can be graphed and summarized in a distribution, just as raw data may be graphed and summarized; Understand the effect of sample size on the S.E.	Explain what a sampling distribution is; Explain how bias and precision of an estimator are measured; Determine the bias and precision of a given estimator; Write a definition of standard error; Determine the standard error of a sampling distribution of sample means and interpret it in context; Appropriately use μ and $\bar{x}$ in context.
	2	The Central Limit Theorem for Sample Means	Although sample statistics vary from the population parameter, they vary in a predictable way; Understand how the Central Limit Theorem describes the shape, center, and spread of sampling distributions of sample statistics; Understand the need for the t-distribution; Understand the similarities and differences between the standard normal distribution and the t-distributions.	Generate sampling distributions of means to observe, empirically, the Central Limit Theorem; Determine the mean and standard deviation of a sampling distribution of means; Recognize situations in which the CLT does/does not apply; Use the Central Limit Theorem in approximating distributions of sample means; Understand how the degrees of freedom determine the shape of a t-distribution,
	3	Answering Questions about the Mean of a Population	Understand that a confidence interval is an estimate of a parameter, with a margin of error; Understand what 95% refers to in a confidence interval.	Recognize situations in which the CLT applies and a confidence interval is appropriate; Recognize situations where a confidence interval is not needed (i.e. know the parameter); Construct a confidence interval for a population mean using the t-multiplier; Interpret a confidence interval for a population mean; Evaluate the validity of claims using a confidence interval; Correctly state the meaning of 95% while interpreting a confidence interval.
	4	Hypothesis Testing for Means	Understand the logic and framework of the inference of hypothesis testing.	Given a research question, conduct a hypothesis test for a population mean; Make a decision using p-value and draw an appropriate conclusion; Relate a "Type I" error and level of significance for a hypothesis test when making a decision.