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Statistics and Prealgebra with Corequisite Support: A Targeted Review

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Source	Author(s) (Text or Video)	Title(s)	Link (where applicable)
OpenStax Text	Lynn Marecek, Santa Ana College MaryAnne Anthony-Smith, Formerly of Santa Ana College	Prealgebra	OpenStax
Mathispower4u Video	James Sousa		Mathispower4u Videos

Source	Author(s) (Text or Video)	Title(s)	Link (where applicable)
OpenStax	Barbara Illowsky, De Anza College Susan Dean, De Anza College	Introductory Statistics	OpenStax
www.onlinestatbook.com	David Lane Developed by Rice University, University of Houston Clear Lake, and Tufts University	Online Statistics Education: An Interactive Multimedia Course of Study	Online Stat Book
JB Statistics	Jeremy Balka, University of Guelph		YouTube Channel

Alta Prealgebra was developed to meet the scope and sequence of a typical one semester prealgebra course. To develop the course, Knewton used three main sources of content: Openstax, videos created by a math Professor we have partnered with, and a team of internal and external Subject Matter Experts. The SMEs come from diverse backgrounds and are all academics in the field of mathematics.

Alta Prealgebra has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our OpenStax instructional texts, our videos, and a network of SMEs, we were able to solicit ideas from math instructors and students. Alta Prealgebra covers the typical breadth of Prealgebra topics and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

Alta Statistics was developed to meet the scope and sequence of an introductory statistics course. To develop the course, Knewton used four main sources of content: OpenStax, Rice University's Online Stat Book, videos created by a Statistics professor at the University of Guelph, and a team of Subject Matter Experts (SMEs). The SMEs come from diverse backgrounds and are all accomplished academics in the field of Statistics. alta Statistics covers the breadth of statistics topics and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

Alta Statistics has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our text, video, and original SME content, we were able to solicit ideas from statistics instructors and students at all levels of higher education, from community colleges to Ph.D- granting universities. Alta Statistics provides a level of academic rigor, while also promoting relevance and accessibility for students. Knewton has added current and relevant contexts and examples to instruction and assessments.

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- Applications of Subtracting Whole Numbers
    - Translate word phrases involving subtraction to math notation
    - Subtract whole numbers in applications

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    - Multiply whole numbers by multi-digit numbers
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1.5 Divide Whole Numbers

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- Simplifying and Solving Equations Using the Division and Multiplication Properties of Equality
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2.5 Choose appropriate graphs to display data

- Choose appropriate graphs to display data

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    - Find the median of a set of data*
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- Basic Probability
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    - Use a contingency table to find conditional probabilities*
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4.1 Discrete Probability Density Functions

- Discrete Probability
    - Understand the properties of a discrete probability density function*
    - Find the mean of a discrete random variable from its probability density function*
    - Find the standard deviation of a discrete random variable from its probability density function*

4.2 Distribution Types

- Binomial Distribution
    - Understand the parameters of the binomial distribution*
    - Use the binomial distribution to compute probability*
- Poisson Distribution
    - Understand the parameters of the poisson distribution*
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    - Create and interpret a Binomial Distribution with Technology - Excel
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    - Find the mean and standard deviation of the uniform distribution*
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- Probability Using the Normal Distribution
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- Using the Normal Distribution with Technology- Excel
    - Use the normal distribution to compute probability with technology - Excel
    - Use the normal distribution to compute a value for a random variable given probability - Excel
    - Use the normal distribution to approximate the binomial with technology - Excel

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7.1 The Central Limit Theorem

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- Use the Central Limit Theorem for Sums to find the sample mean and sample standard deviation*
- Use both forms of the Central Limit Theorem to compute probability*

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8.1 Confidence Intervals for Population Mean

- Standard Error
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    - Calculate the Sample Mean given a confidence interval

- Confidence Interval for Population Mean- Population Standard Deviation Known
    - Finding the z-Score Given the Confidence Level (CL)
    - Finding the Confidence Coefficient and Error Bounds
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- Confidence Interval for Population Mean- Population Standard Deviation UnKnown
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    - Use the Student's t-distribution to calculate the confidence interval for a population mean with an unknown standard deviation*
- Confidence Intervals for Population Proportion
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    - Calculate the mean and standard deviation of the sampling distribution of sample proportions
    - Find the confidence interval given a population proportion*
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- Empirical Rule
    - Calculate margin of error and confidence intervals
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    - Compute confidence intervals for the difference in population means

8.3 Calculating Confidence Intervals with Technology

- Calculating Confidence Intervals with Technology - Calculator
    - Calculate a Confidence Interval for the Mean, population standard deviation known - Calculator
    - Calculate a Confidence Interval for the Mean, population standard deviation unknown - Calculator
    - Calculate a Confidence Interval for a Proportion - Calculator
- Calculating Confidence Intervals with Technology - Excel
    - Calculate a Confidence Interval for the Mean, population standard deviation known - Excel
    - Calculate a Confidence Interval for the Mean, population standard deviation unknown - Excel
    - Calculate a Confidence Interval for a Proportion - Excel

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Chapter 9: Hypothesis Testing for One Population

9.1 Hypothesis Test for the Mean - Population Standard Deviation Known

- Developing Hypothesis and understanding Possible Conclusions
    - Identify the null and alternative hypotheses for an experiment with one population mean
    - Distinguish between one- and two-tailed hypothesis tests and understand possible conclusions
    - Differentiate between Type I and Type II errors when performing a hypothesis test
    - Compute the value of the test statistic (z-value) for a hypothesis test for one population mean with a known standard deviation*
- Conduct a Hypothesis Test for Mean – Population Standard Deviation Known - Critical Value/Rejection Region Approach
    - Determine the critical value(s) of a one-mean z-test at a given significance level to define a rejection region*
    - Make a conclusion and interpret the results of a one-mean hypothesis test (population standard deviation known) using the Critical Value/Rejection Region Approach
- Conduct a Hypothesis Test for Mean - Population Standard Deviation Known: P-Value Approach
    - Find the p-value using a table given test statistic value (z-score) of a one-mean hypothesis test
    - Make a conclusion and interpret the results of a one-mean hypothesis test (population standard deviation known) using the P-Value Approach

9.2 Developing Hypothesis and understanding Possible Conclusions

- Developing Hypothesis and understanding Possible Conclusions
    - Compute the value of the test statistic (t-value) and degrees of freedom for a hypothesis test for one population mean with an unknown population standard deviation*
- Conduct a Hypothesis Test for Mean – Population Standard Deviation Unknown - Critical Value/Rejection Region Approach
    - Conduct and interpret a one-mean hypothesis test using the Critical Approach with an unknown standard deviation*
    - Make a conclusion and interpret the results of a one-mean hypothesis test (population standard deviation unknown) using the Critical Value/Rejection Region Approach
- Conduct a Hypothesis Test for Mean - Population Standard Deviation Unknown: P-Value Approach
    - Determine the p-value for a hypothesis test for the mean (population standard deviation unknown)
    - Make a conclusion and interpret the results of a one-mean hypothesis test (population standard deviation unknown) using the P-Value Approach

9.3 Hypothesis Test for Proportion

- Developing Hypothesis and understanding Possible Conclusions
    - Identify the null and alternative hypotheses for an experiment with one population proportion
    - Compute the value of the test statistic (z-value) for a hypothesis test for proportion
- Conduct a Hypothesis Test for Proportion – Critical Value/Rejection Region Approach
    - Determine the critical value(s) for a hypothesis test for the proportion in order to define rejection region(s)

        - Make a conclusion and interpret the results of a hypothesis test for a proportion using the Critical Value/Rejection Region Approach
    - Conduct a Hypothesis Test for Proportion - P-Value Approach
        - Determine the p-value for a hypothesis test for proportion
        - Make a conclusion and interpret the results for a hypothesis test for proportion using the P-Value Approach

9.4 Hypothesis Testing with Technology

- Hypothesis Testing with Technology - Calculator
    - Perform and interpret a hypothesis test for the mean, population standard deviation known using Technology - Calculator
    - Perform and interpret a hypothesis test for the mean, population standard deviation unknown using Technology - Calculator
    - Perform and interpret a hypothesis test for a proportion using Technology - Calculator
- Hypothesis Testing with Technology - Excel
    - Perform and interpret a hypothesis test for the mean, population standard deviation known using Technology - Excel
    - Perform and interpret a hypothesis test for the mean, population standard deviation unknown using Technology - Excel
    - Perform and interpret a hypothesis test for a proportion using Technology - Excel

Chapter 10: Hypothesis Testing with Two Populations

10.1 Two-Mean Hypothesis Tests – Independent Samples - Population Standard Deviations Known

- Two-Mean Hypothesis Test with Population Standard Deviations Known
    - Identify null and alternative hypothesis for testing the difference between two means - independent samples - population standard deviations known
    - Calculate test statistic for testing the difference between two means (z value) - population standard deviations known
- Two-Mean Hypothesis Test - Population Standard Deviations Known - Critical Value/Rejection Region Approach
    - Determine the critical value(s) for a hypothesis test for the difference between two means (population standard deviations known) in order to define rejection region(s).
    - Make a conclusion and interpret the results for testing the difference between two means (population standard deviations known) using the Critical Value/Rejection Region Approach
- Two-Mean Hypothesis Test - Population Standard Deviation Known - P-Value Approach
    - Determine the p-value for a hypothesis test for the difference between two means (population standard deviations known).
    - Make a conclusion and interpret the results for testing the difference between two means (population standard deviation known) using the P-Value Approach

10.2 Two-Mean Hypothesis Tests – Independent Samples - Population Standard Deviations Unknown

- Two-Mean Hypothesis Tests with Population Standard Deviations Unknown
    - Identify and understand the null and alternative hypotheses for an experiment with two population means

        - Calculate the test statistic for a two-mean hypothesis test for population variances assumed equal (pooled estimate of the standard deviation)
        - Calculate the test statistic for a two-mean hypothesis test for population variances assumed unequal (nonpooled estimate of the standard deviation)
        - Determine the degrees of freedom for a two-mean hypothesis test for population variances assumed equal (pooled estimate of the standard deviation)
        - Determine the degrees of freedom for a two-mean hypothesis test for population variances assumed unequal (nonpooled estimate of the standard deviation)
    - Conducting a Two-Mean Hypothesis Tests - Population Standard Deviation Unknown - Critical Value/Rejection Region Approach
        - Determine the critical value(s) for a hypothesis test for the difference between two means (population standard deviations unknown) in order to define rejection region(s).
        - Make a conclusion and interpret the results for testing the difference between two means (population standard deviations unknown) using the Critical Value/Rejection Region Approach
    - Conducting a Two-Mean Hypothesis Tests - Population Standard Deviation Unknown - P-Value Approach
        - Determine the p-value for a hypothesis test for the difference between two means (population standard deviations unknown).
        - Make a conclusion and interpret the results for testing the difference between two means (population standard deviation unknown) using the P-Value Approach

10.3 Two Mean Hypothesis Tests (Dependent Samples)

- Two Mean Hypothesis Tests (Dependent Samples)
    - Identify dependent samples versus independent samples
    - Identify the null and alternative hypothesis involving the hypothesized mean of the differences for the paired data
    - Calculate the test statistic and degrees of freedom for a hypothesis test for the differences of paired data (dependent samples)
- Two Mean Hypothesis Tests (Dependent Samples) - Critical Value/Rejection Region Approach
    - Determine the critical value(s) for a hypothesis test for the mean of the differences for the paired data in order to define rejection region(s).
    - Make a conclusion and interpret the results for testing the difference between means for paired data (dependent samples) using the Critical Value/Rejection Region Approach
- Two Mean Hypothesis Tests (Dependent Samples) - P-Value Approach
    - Determine the P-value for a hypothesis test for the mean of the differences for the paired data in order to define rejection region(s).
    - Make a conclusion and interpret the results for testing the difference between means for paired data (dependent samples) using the P-Value Approach

10.4 Two population hypothesis test for proportions (Independent Samples)

- Two population hypothesis test for proportions (Independent Samples)
    - Identify the null and alternative hypotheses for a hypothesis test to test the difference between two population proportions
    - Confirm the conditions are satisfied to use a z-test for the hypothesis test to test the difference between two population proportions

        - Compute the value of the test statistic (z-value) for a hypothesis test to test the difference between two population proportions
    - Two population hypothesis test for proportions (Independent Samples) - Critical Value/Rejection Region Approach
        - Determine the critical value(s) for a hypothesis test to test the difference between two population proportions in order to define rejection region(s).
        - Make a conclusion and interpret the results for a hypothesis test to test the difference between two population proportions using the Critical Value/Rejection Region Approach
    - Two population hypothesis test for proportions (Independent Samples) - P-Value Approach
        - Determine the p-value for a hypothesis test to test the difference between two population proportions
        - Make a conclusion and interpret the results for a hypothesis test to test the difference between two population proportions using the P-Value Approach

10.5 Two-Mean Hypothesis Testing with Technology

- Two-Mean Hypothesis Testing with Technology - Calculator
    - Perform and Interpret a Two-Mean Hypothesis Test (population standard deviations known) with Technology - Calculator
    - Perform and Interpret a Two-Mean Hypothesis Test (population standard deviations unknown) with Technology - Calculator
    - Perform and Interpret a Hypothesis Test for Dependent (paired data) with Technology - Calculator
    - Perform and Interpret a Two-Proportion Hypothesis Test with Technology - Calculator
- Two-Mean Hypothesis Testing with Technology - Excel
    - Perform and Interpret a Two-Mean Hypothesis Test (population standard deviations known) with Technology - Excel
    - Perform and Interpret a Two-Mean Hypothesis Test (population standard deviations unknown) with Technology - Excel
    - Perform and Interpret a Hypothesis Test for Dependent (paired data) with Technology - Excel
    - Perform and Interpret a Two-Proportion Hypothesis Test with Technology - Excel

Chapter 11: Chi-Square Distributions

11.1 Introduction to the Chi-Square Distribution

- Introduction to the Chi-Square Distribution
    - Understand the properties of the chi-square distribution*
    - Distinguish between use cases of the chi-square tests

11.2 Chi-Square Tests

- Chi-Square Goodness-of-Fit Test
    - Compute the value of the test statistic using the expected frequencies for a chi-square goodness-of-fit test*
    - Conduct and interpret a chi-square goodness-of-fit test*

- Chi-Square Independence Test
    - Compute the value of the test statistic using the expected frequencies for a chi-square independence test
    - Conduct and interpret a test of independence with the chi-square distribution*
- Chi-Square Homogeneity Test
    - Compute the value of the test statistic using the expected frequencies for a chi-square homogeneity test
    - Conduct and interpret a test for homogeneity with the chi-square distribution*

Chapter 12: Linear Regression

12.1 Linear Regression Equations

- Linear Regression Equations and Application
    - Understand properties of linear equations
    - Understand the relationship between scatter plots and table and determine patterns
    - Find the linear regression equation given a list of data points*
- Uses of Linear Regression
    - Find and interpret the correlation coefficient
    - Make predictions using a line of best fit
    - Find outliers in a data set*

12.2 Recognizing Multivariate Relationships

- Multivariate Relationships
    - Identify applications where Multiple Regression can be performed
    - Define the format for a multiple regression equation
    - Make predictions using the multiple regression equation

12.3 Linear Regression with Technology

- Performing Linear Regressions with Technology – Calculator
    - Calculate the correlation coefficient using Technology - Calculator
    - Determine the best fit linear regression equation using Technology - Calculator
- Performing Linear Regressions with Technology – Excel
    - Calculate the correlation coefficient using Technology - Excel
    - Determine the best fit linear regression equation using Technology - Excel

Chapter 13: Introduction to ANOVA

13.1 ANOVA Basics – Critical Value Approach

- Determine appropriate situations for a one-way ANOVA test and identify the null and alternative hypotheses
- Determine the degrees of freedom for the numerator and denominator for one-way ANOVA test
- Determine the critical value and rejection region for one-way ANOVA test
- Calculate the test statistic for one-way ANOVA test
- Make a decision for the hypothesis test using critical value/rejection region method and interpret results

13.2 Performing an ANOVA test - Critical Value Method - Calculator

- Make a decision for the hypothesis test using critical value/rejection region method and interpret results – Calculator

13.3 Performing an ANOVA test - Critical Value Method - Excel

- Make a decision for the hypothesis test using critical value/rejection region method and interpret results – Excel

13.4 Performing an ANOVA test Basics – P-Value Approach - Calculator

- Make a decision for the hypothesis test using the p-value method and interpret results – Calculator

13.5 Performing an ANOVA test Basics – P-Value Approach - Excel

- Make a decision for the hypothesis test using the p-value method and interpret results – Excel