| Week | Class | Activity |
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| 1 | 1 | Basic Concepts of Statistics (Meaning, characteristics and uses of Statistics), Study designs, errors, Branches of Statistics (Descriptive and Inferential Statistics), sample, population, Group and ungroup data, dataset, Types of Variables (Qualitative & Quantitative, Discrete and Continuous)<br>**Exercise questions: Chapter no.1 from David Anderson** |
| | 2 | Measurement scales, summarization of qualitative and quantitative data into tabular and graphical form Graphical Representation (Bar chart, Pie-chart)<br>**Exercise questions: Chapter no.2 from David Anderson** |
| 2 | 3 | Group data: construction of frequency distribution, Percentage frequency, Relative frequency, cumulative Frequency types, mean, variance and Histogram.<br>**Exercise questions:** 1.18, 1.21,1.22 |
| | 4 | Measures of Central Tendency (ungroup data), Mean, median, mode, Trimmed mean [trim % and total trim both school of thought], Quartiles and Percentiles. Dot Plot, Five point summary, Box plot, Outlier detection (Z-score and Box plot) Skewness (Pearson's, histogram and Relation between mean, median and mode)<br>**Exercise questions:** 1.1, 1.2, 1.3, 1.4,1.30 |
| 3 | 5 | Measures of Dispersion (ungroup data), Variance, Standard Deviation, IQ-Range, Coefficient of Variation, Cross-Tabulation<br>**Exercise questions:** 1.13, 1.14, 1.17 |
| | 6 | Completed the previous class topics with practice questions/applications. |
| 4 | 7 | Introduction to probability, Set Theory, Tree diagram, Venn diagram (optional), Random Experiment, events (Simple & Composite), Counting techniques (Rule of multiplication, Permutation and Combination).<br>**Exercise questions**: 2.21 to 2.47 all |
| | 8 | Probability of an event, Cross tab from raw data, joint probability table, All laws ( addition, complementation, multiplication, conditional)<br>**Exercise questions:** 2.53, 2.54, 2.56, 2.58, 2.59, 2.67, 2.76, 2.75, 2.80, 2.83 |
| 5 | 9 | Continuations of Probability laws, Independence, Application of Probability rules for two events are added. Also discussed the extension of every rule to k events. .<br>**Exercise questions:** 2.78, 2.81, 2.86 |
| | 10 | Multiplication rule continued, Bayes theorem. Bayesian Spam filter for one word and two words problems (equally likely events)<br>**Handouts and Exercise questions:** 2.95, 2.96, 2.97, 2.98, 2.99, 2.101 |

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| **6** | 11 | **MID-1** |
| | 12 | Concept of random variable, Discrete probability distribution, Probability mass function plot, probability histogram, Cumulative Distribution Function, CDF plot,<br>Mathematical expectation and Variance of discrete random variable.<br>**Exercise questions:** 3.11, 3.12, 3.13, 3.22, 3.24, 4.1, 4.4, |
| **7** | 13 | Expectation and variance of function of discrete random variable, Properties of Expectation and variance.<br>**Exercise questions:** 4.17, 4.55, 4.57 |
| | 14 | Joint Probability distribution for discrete random variable, marginal distributions, conditional distribution for Y given X and X given Y, Expectation, variance, covariance, correlation and statistical independence.<br>**Exercise questions**: 3.39, 3.48, 3.49, 3.50, 3.51, 4.10, 4.51, 4.60, 4.97 |
| **8** | 15 | Continuous random variable, PDF, CDF, Finding PDF and Probability by using CDF<br>**Exercise questions**: 3.6, 3.7, 3.9, 3.14, 3.21, 3.29, 3.36 |
| | 16 | Expectation and Variance of continuous random variable, Expectation and variance of function of continuous random variable, Finding probabilities from dual function.<br>**Exercise questions**: 4.12, 4.20, 4.29, 4.50, 4.101 |
| **9** | 17 | Discrete Probability Distributions, Introduction to binomial distribution, Binomial probability function, Properties of binomial distribution, parameters, mean and variance.<br>**Exercise questions:** 5.4, 5.6, 5.9, 5.10, 5.15, 5.20 |
| | 18 | Hypergeometric probability distribution, Characteristics, parameters, application, mean and variance.<br>**Exercise questions:** 5.29, 5.30, 5.31, 5.32, 5.33, 5.40, 5.41 |
| **10** | 19 | Poisson distribution, Probability Function, Characteristics, parameters, application, mean and variance,<br>**Exercise questions:** 5.56, 5.57, 5.58, 5.71, 5.87 |
| | 20 | Normal distribution, pdf and its characteristics, Parameters, Mean and variance, standard normal distribution, Area under the normal curve, application of normal distribution, Using the normal curve in reverse. |

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| **11** | 21 | **Exercise questions:** 6.5, 6.6, 6.8, 6.11, 6.12, 6.13, 6.14, 6.15, 6.17, 6.28, 6.30, |
| | 22 | Continuation of normal distribution and practice questions. |
| **12** | 23 | **MID-II** |
| | 24 | Concept of estimation, point estimation, interval estimation, confidence interval for single mean when sigma is known, confidence interval for single mean when sigma is unknown.<br>**Exercise questions:** 9.2, 9.3, 9.10, 9.11, 9.14, |
| **13** | 25 | Continuation of Interval estimation when pop size is known |
| | 26 | Introduction to hypothesis testing, concept of statistical hypothesis, simple and composite hypothesis, test statistics, Type I and Type II error [show with examples], Critical region and acceptance region, one tail and two tail test, General procedure for testing of hypothesis. |
| **14** | 27 | Testing of hypothesis for single mean, Z-test (sigma known) and t-test (sigma unknown).<br>**Exercise questions:** 10.19, 10.20, 10.21, 10.23, 10.25, 10.26 |
| | 28 | Introduction to Simple linear Regression and Multiple linear Regression, SLR Model, SLR applications<br>,**Exercise questions:** 11.9, 11.11, 11.12, 11.13, 11.14, |
| **15** | 29 | Partition sum of squares, explained, unexplained [residuals] and total variation, Correlation coefficient, Coefficient of determination.<br>**Exercise questions:** 11.39 (a,b,c), 11.41, 11.43, 11.53 (a),<br>**Chapter no.14 from David Anderson** |
| | 30 | Hypothesis testing in SLR Regression: Testing of Regression coefficient, overall significance of regression (ANOVA) approach, Testing of correlation coefficient.<br>**Example:** 11.3, 11.10, 11.11<br>**Exercise question:**11.38, (a), 11.40 (a) (ANOVA), 11.44, 11.45 (a, b:$\rho < 0$ ) , 11.49. |