

Selection of Topics for Math 105

General graph theory

- Circuits and Paths
- Graph Models, Concepts, Usage
- Euler's Theorems
- Euler Graphs, Fluey's Algorithm
- Hamilton circuits and Hamilton paths
- Brute Force
- Nearest neighbor algorithm (including repetitive nearest neighbor)
- Cheapest-link algorithm
- Networks
- Trees
- Kruskal's algorithm and Prim's algorithm
- Scheduling
- Basic Elements of Scheduling
- Dependent and Independent events
- Directional Graphs
- Critical Time and Critical path

Statistics

- Sampling Methods, how is data collected
- Bias
- Polling and clinical studies
- Estimating Population (Capture-Recapture)
- How statistical data is collected and how it can be used to mislead the public
- Descriptive Statistics
- Compute the mean, median, mode percentile, and standard deviation for a data set.
- Use statistics to analyze data.
- Box and whiskers
- Frequency, relative frequency tables
- Bar graphs, pie charts, histogram charts

Finance

- Percentages, markups and markdowns
- Solve interest problems using interest formulas for simple, compound and continuous interest.
- Effective Annual rates
- Credit Cards and rent to own problems
- Analyze and solve problems using savings and amortization formulas.
- Annuities, savings plans where periodic payments are made
- Affordability of buying a house

Voting Methods

- Preference schedule
- Plurality, Plurality with elimination, Majority
- Borda Count
- Pair-wise competition, Condorcet competition
- 4 Fairness Criteria,
- Arrow's Impossibility Theorem
- How the site of the Olympic Games is chosen, academy awards are chosen
- Weighted Voting System
- Power: dictator, veto, dummy
- Banzhaf Power Index
- Shapley-Shubik Power Index
- Apportionment
- Hamilton Method
- Jefferson's and Adam's method
- Webster's Method
- Huntington-Hill's Method

Quota Rule and Paradoxes (Alabama, Population and New State)