OFFICIAL MIDTERM 1 SYLLABUS

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Here's an "official" midterm syllabus that I dug up from Canvas. We covered this and different content in class, and certainly used more sophisticated terminology.

To critique the following syllabus, start noticing::

- *they're only sketchs of recipes for performing "pseudo-mathematics",*
- *they're dated by the job markey*
- *they're contrained by calculator computation,*

However, I want all y'all to suceed in the midterm. Let's have a "cautious" look at the material together. You should check the trello board $https://trello.com/c/j6y05cHj$ for about 30 pages in supplement to this midterm outline. The further outlines are written so that one can both learn and study from working through problems.

1. CONTENT ON MIDTERM 1

1. Sampling Techniques
    - Stratified
    - Clustered
    - Simple random sample (SRS)
    - Systematic
2. Classifying Variables
    - Quantitative
    - Qualitative
3. Levels of Measurement
    - Nominal
    - Ordinal
    - Interval
    - Ratio
4. Statistics vs. Parameters
    - Samples vs. statistics
    - Populations vs. parameters
5. Experiments vs. Observational studies
    - Control vs. treatment groups
    - Variable = what we are measuring
    - Placebo

6. Histograms
   - Quantitative
   - Class width
     - Max – Min divided by number classes (round up to nearest whole number)
     - Midpoint = middle of class
   - Class boundaries
     - Subtract 0.5 from lower limit
     - Add 0.5 to upper limit
7. Other graphs/charts
   - Ogive vs. time series
   - Circle graph
     - Mutually exclusive portions of the pie ONLY
   - Bar graph vs. pareto
   - Stem & leaf
   - Box & whisker
8. Shapes of distributions
   - Mound/symmetric
   - Skewed
   - Uniform
   - Bimodal
9. Frequency tables
   - L1 = data points
   - L2 = frequency of each data point
10. 5% trimmed mean
    - Determine n (number of data points)
    - N * 0.05 (yields number to trim off of top and bottom)
    - Re-compute mean using 1-var stats
11. Weighted averages
12. Basic Stats
    - Mean
    - Median
    - Quartiles (Q1, Q3, IQR)
    - Min/Max
    - Mode
13. Coefficient of variation
    - σ / μ, then convert to % (aka x100)
    - What % of the mean is the standard deviation
14. Chebyshev's Theorem
    - $1 - 1/(k^2)$ gives the proportion of data that lies within a radius of k standard deviations from the mean
    - therefore, at least 75% lies within 2 standard deviations
    - have we supplied proof enough?

15. Probability
   - Mutually exclusive events vs. independent events
     - Mutually exclusive = add to 1
     - Independent = one thing doesn't affect probability of another thing
   - With vs. without replacement & how that affects 2-component probability problems
   - Sample space {x, y, z}
   - $P(A)$ vs. $P(A)^c$
   - sum of probabilities always = 1
   - Common examples:
     - 6 sided die
     - 52 deck of cards
     - Roulette
   - "Given" probabilities & contingency tables
   - P (A or B) vs. P(A & B)
   - Continuous vs. discrete random variables
   - Probability distribution tables
     - Calculate average or expected value & st. dev. based on probability distribution
16. Odds
   - odds for = ways to get what you want : ways to not get what you want
   - Odds against = reverse
     - Also called "betting odds"
   - Relation to probability
     - If odds are X:Y, X + Y = denominator of probability expression
17. Binomials
   - N, P, R (X) notation
   - Binompdf = EXACT number of outcomes
   - Binomcdf = all other scenarios
     - Calculator counts from 0 to number you put in for x
     - Use binomcdf for following scenarios:
       * "At most x"
       * "X or less"
       * "Fewer than x"
     - Must do 1 – binomcdf for the following scenarios:
       * "At least x"
       * "X or more"
       * "Greater than x"
   - Rules for using binomials
     - Independent events/trials
     - Only 2 outcomes (success or failure)
   - Using table function
     - Y = binomial function (X, p, r,)
     - 2nd, table
     - Determine correct N for probability given

18. Normal Distributions
    - Normal vs. Standard Normal
    - Symmetrical properties
    - Empirical rule
        - 68% within 1σ, 95% within 2σ, 99.7% within 3σ of μ
    - Z-scores (Negative vs. positive z-scores and how they relate to μ)
        - $Z = x - \mu$
    - Find probability/area given Z-score or x-value (Normalcdf)
    - Find Z-score given area (invNorm)
19. Control Signals
    - 9 consecutive values are above mean or 9 consecutive values are below mean
    - Any value is outside of 3σ (+/-)
    - 2 of 3 consecutive values are between +/- 2-3σ
20. Central Limit Theorem
    - As n increases, x bar distribution approaches x normal distribution
    - Need n $>=$ 30 if we don't know our original distribution is normal

2. CALCULATOR FUNCTIONS

1. `INPUTTING DATA INTO LISTS (L1, L2)`
2. `1-VAR STATS`
3. `BINOMPDF`
4. `BINOMCDF`
5. `TABLE FUNCTION TO FIND N FOR BINOMIALS`
6. `NORMALCDF`
7. `INVNORM`