

**MTH 1210 Exam I Topics** The exam covers the material on Slides 1-6, Homeworks 1-3, and Sections 1.1-1.4, 2.1-2.4, and 3.1-3.5 in the book. Exam problems will be similar to examples and exercises done in class, homework problems, and sample exam problems.

**Types of variables:** know the difference between  
Discrete quantitative (numerical) variables  
Continuous quantitative (numerical) variables  
Nominal qualitative (categorical) variables  
Ordinal qualitative (categorical) variables

**Population and sample:** know the difference

**Biased sampling** schemes and **types of bias:** know how to recognize each of the following

Selection bias:  
Convenience sampling  
Voluntary response sampling  
Nonresponse bias

**Unbiased sampling** scheme: **Simple random sampling (SRS)**

Know how a simple random sampling is selected  
Know that simple random sampling is unbiased

**Observational studies and experiments**

Be able to distinguish between observational studies and experiments  
Explanatory and response variables: know the difference  
“Lurking” (confounding) variables  
Know what a “lurking” variable is  
Know how to recognize possible “lurking” variables in observational studies  
Know how “lurking” variables explain why observational studies can’t establish cause/effect relationships  
Three Principles of Experimental Design: know what these are and why they’re important

**Frequency distribution tables:** know how to make them for qualitative and for quantitative data.

**Bar charts** (for displaying qualitative data): know how to make and interpret them

**Histograms** (for displaying quantitative data)

Know how to make them  
Know how to interpret them and what to look for (i.e. center, spread, shape, outliers and other interesting features)

**Summary statistics for center: mean and median**

Know how to compute each of them  
Know how to interpret each of them  
Know which is resistant to outliers and which isn't

**Summary statistics for spread: range, standard deviation, and the interquartile range**

Know how to compute each of these  
Know how to interpret each of them  
Know which are resistant and which aren't

**Five-number summary and boxplots**

Know which five numbers comprise the five-number summary  
Know how to make a boxplot from the five-number summary  
Know how to recognize skewness in data from a the five-number summary or boxplot  
Know how to use the 1.5(IQR) rule to obtain "fences" for deciding if an observation is an outlier

**Empirical Rule (i.e. the 68-95-99.7 Rule)**

Know what it says about data whose distribution is bell-shaped  
Know how to use it to find the proportion of observations *between* two numbers, *greater* than some number, or *less* than some number

**Z-scores**

Know how to compute a z-score when you're given the mean and standard deviation  
Know that a z-score tells how many standard deviations an observation is above or below the mean (i.e. it's in *standard units*)  
Know how to use z-scores to compare the relative standing of two individuals