MTH 1210 Exam II Topics The exam covers the material on Slides 7-12, Homeworks 4-6, and Sections 4.1-4.6, 5.1-5.2, and 6.1-6.3 in the book. Exam problems will be similar to examples and exercises done in class, homework problems, and sample exam problems.

Probability terminology: know what each term means
- Chance experiment
- Sample space
- Event
- Mutually exclusive events
- Independent events

Probabilities for equally likely outcomes: know the f / N Rule for computing probabilities when the outcomes of the chance experiment are equally likely

Basic properties of probabilities: know each of the following and how to apply them to obtain probabilities
1. For any event A, $0 \le P(A) \le 1$.
2. $P(A) = 0$ means the event A cannot occur.
3. $P(A) = 1$ means the event A is certain to occur.

Relationships among events: for two events A and B, know what is meant by
- *not* A (i.e. the complement of the event A)
- A *or* B
- A *&* B

Venn diagrams: know how to make them and interpret them

Some probability rules: know each of the following and how to apply them to obtain probabilities
1. **Complementation Rule**: For any event A, $P(A) = 1 - P(\textit{not } A)$, and also $P(\textit{not } A) = 1 - P(A)$
2. **Special Addition Rule**: If A and B are *mutually exclusive* events, then $P(A \textit{ or } B) = P(A) + P(B)$
3. **General Addition Rule**: If A and B are *any* events, then $P(A \textit{ or } B) = P(A) + P(B) - P(A \,\&\, B)$

Contingency tables (showing frequencies):
- Know what they are and what information they convey
- Know how to interpret *cell* frequencies and *marginal total* frequencies

Conditional probability and **independence**
- Know what is meant by *independence* of two events
- Know what is meant by a *conditional probability*
- Know how to calculate conditional probabilities from contingency tables, when drawing cards from a deck or items from a jar, etc.

Know that events A and B are independent when: $P(B \mid A) = P(B)$

More probability rules: know each of the following and how to apply them to real world probability calculations

Special Multiplication Rule:

1. For two *independent* events A and B, $P(A \& B) = P(A) \cdot P(B)$
2. For more than two *independent* events, e.g. A, B, and C, $P(A \& B \& C) = P(A) \cdot P(B) \cdot P(C)$

General Multiplication Rule: For *any* two events A and B,
$P(A \& B) = P(A) \cdot P(B \mid A)$

Random variables, terminology: know what each of the following means

Random variable
Discrete random variable
Continuous random variable
Probability distribution of a random variable
Probability histogram of a discrete random variable
Probability density curve of a continuous random variable

Mean μ of a discrete probability distribution:

Know how to compute μ from the probability distribution of the random variable, i.e. $\mu = \sum xP(X = x)$.
Know how to interpret μ as a measure of the center of the probability distribution
Know how to interpret μ as the long-run average value of the random variable, and also as a population mean.

Properties of probability density curves:

The area under the curve above any interval represents the proportion of individuals whose x values fall in that interval.
The entire curve lies on or above the x axis.
The total area under the curve is equal to 1.0.

Normal distributions (i.e. normal density curves): know how to do each of the following

Find areas under any normal density curve (representing percentages or proportions of the population) by standardizing (i.e. $z = \frac{a-\mu}{\sigma}$) and using the Table II.
Find percentiles (x values for a given proportion) by finding the appropriate z value (working "backwards from Table II) and then "unstandardizing" it (i.e. $x = \mu + z\sigma$).