Midterm 1 : Tuesday May 31st

4:30 - 6pm

Chap 1 - chap 4

MC + short answer

Course calendar on learn

Math Soc Uwaterloo

Exam Bank

Chap 1 : Types of Probabilities

1. Classical definition
2. Relative frequency
3. Subjective

Chap 2 S = Sample Space

Outcome / simple event

vs.

Compound event

- Size of an event = $|A|$

$$P(A) = \frac{|A|}{|S|}$$

- for each outcome a_i

$$0 \le P(a_i) \le 1$$

$$\sum_{\text{all } i} P(a_i) = 1 = P(S)$$

$a_1, a_2, \ldots, a_k$ are Mutually exclusive

Chap 3: "OR" = addition

"And" = multiplication

With vs. without replacement

$n \times n \times \cdots \times n = n^r$

$n! = n \times (n-1) \times \cdots \times 1$

$nP_r = \frac{n!}{(n-r)!}$ Select r objects from n when order matters

123 vs. 231 these are distinct arrangements

Creating Subsets of size r from n objects

$nC_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$

i.e order does NOT matter

Chap 4 • Probability Rules

- $P(S) = 1$
- $0 \leq P(A) \leq 1$
- if $A \subseteq B$ then $P(A) \leq P(B)$

• Venn diagrams

- Union of events: $A \cup B$ — A or B or Both

$$P(A \cup B) = P(A) + P(B) - P(AB)$$

- Intersection: $A \cap B = AB$ "AND" = Both
- De Morgan's Law:

$$\overline{(A \cap B)} = \bar{A} \cup \bar{B}$$

$$\overline{(A \cup B)} = \bar{A} \cap \bar{B}$$

Mutually Exclusive events: $P(AB) = 0$

- Independent iff $P(AB) = P(A)P(B)$
- Conditional Probability: $P(A|B)$ "A GIVEN B"

$$= \frac{P(AB)}{P(B)}$$

- Tree diagrams
- Product rule
- Partition rule
- Bayes theorem