Finite Mathematics Test 1 Guide

Section 7.1

Basics Def. A set is a well- defined collection of items.

Natural Numbers

Whole Numbers

Integers

Rational Numbers

Irrational Numbers

Subset –Set A is a subset of B if every element of A is contained in B.

Subsets of A= (1,2.3) (1,2) is a subset of A (1,2) ʗ A

A is a subset of A also Ø is a subset of A

If a set has n elements, how many subsets does A have?

Empty set Ø

Complement of a set- if U = universal set , say U= !1,2,3,4,5) let A= (1,2,3) A complement= A' = (4,5)

Union A U B means a set with elements from A or B. A Let A = (5,6,7)

Let B= (2, 5,7,9) AU B =(2,5,6,7,9).

Intersection of two sets means the set of elements from sets A and B A ᴒ B = (2,5,9)

Section 7.2

Venn Diagrams are geometric drawings that illustrate union and intersection.

Ex. Let X = (9,12,15,16) Let Y= (15,16,18)

Draw a Venn Diagram to illustrate X u Y

Draw a Venn Diagram to illustrate X ᴒ Y

Suppose M = ( 9,12) Draw a Venn diagram to illustrate M ʗ X.

Number of distinct elements in X UY=n(x)+ n(Y) –n (XᴒY).= 4+3-2=5.

HW 1. P 308 , 1,3,7,9,21, 25, 63

P. 317, 1,3,7, 33,42 a,b,c, 49

Introduction to Probability 7.3

Def. Sample space is the set of all possible outcomes.

Coin Flip

Die throw

52 card deck.

Def. Probability of an event E P (E) = f/n

f =number of outcomes for E . n = # of possible outcomes

If each outcome is equally likely.(PROBLEM) ??

The higher your level of education, the -----your level of certainty.

HW 2. P 326, 3,5, 19, 21, 25,27,54, 58

Basic Concepts of Probability 7.4

For event E or M in one trial probability of E or M = P( E or M)

= P(E U M) = P(E ) + P(M) – P(E and M)

Examples One pick from 52 card deck Prob of spade P(Spade) , P (Ace), P ( queen of spades)

 Die throw P (1), P (even number).

P(Ace or spade) P (king or queen) P (Ace or King or Heart)

 Property P (not A ) = P( A') = 1- P(A) Examples

Def. If Odds in favor of event E are M to N , P(E ) =N(M+N).

Ex. Odds favoring a horse winning are 5 to 7 means P(winning) =5 (5+7) =5/12

Ex. If P(rain ) = 1/3 then odds in favor of rain are 1/3 /2/3 =12 or 1 to 2.

H 3. P 335, 15, 24, 27, 29, 32 a,b

Conditional Probability - Independence (Major problem in research)

Two or more consecutive events

Ex. Pick two consecutive cards from a 52 card deck Find probability of picking two consecutive aces (a)with replacement of the first Ace or (b) with replacing the first Ace

Conditional Probability refers to Probability of drawing the second Ace after drawing the first = P(A₂I A₁)

Find the P( A₂IA₁)

1. if you replace the Ace from the first draw
2. if you tear up the first Ace and pick.

Product Rule To find the probability of event A followed by event B

P( A and B)=P(A) .P(BIA)

Ex. Find the probability of selecting two consecutive Aces (a) with replacement (b) Without replacement.

Ex. Find the probability of selecting two consecutive hearts (a) with replacement (b) without replacement.

Ex. Calculus class has twenty women , fifteen men. You need two representatives . Find probability of both women, both men.

Ex. You win 10 % of the time in tennis. Find probability of three consecutive wins.

Ex. A bowl has ten red balls and twenty white balls. Find probability of picking two consecutive balls (a) with replacement (b) withpit replacement.Independent Events

If E and F are independent events P( E and F) = probability of E followed by F is P(EᴒF) = PE) . P(F ) .

If P(E) .P(F) ≠ P(EᴒF) , then event and event F are dependent- not independent. Big problem in research. Biased samples.

Ex. Which examples have independent events.

Ex. If probability of A P(A) = 1/3 , P(B)=1/2 , and P(A ᴒB)= 1/5 , are A and B independent events ?

Ex. Find the probability of rolling a 6 if the result was odd.

Ex. Two cards are drawn from a 52 card deck. Find probability of the second a black card if the first was a spade.

Ex. Sixty % of men are overweight- 50 % of women. 51% of Americans are women, 49% men.

Select one person randomly. Find Probability of selecting an overweight man, overweight woman. Are the events male and overweight independent?

H4. P 350, 1,3, 5,7, 9,11,13, 29, 33, 42, 48

Bayes’ Theorem Section 7.6

Suppose we are given that happened and we want to know what might have effected this event from the past. For example suppose bowl A has 2 red balls and 2 white balls. Suppose bowl B has 2 white and 5 red. Now a bowl was selected at random and a red ball came up. Suppose we want to know whether it came from bowl B.

P (red I bowl 1) =1/2

P (red I bowl 2) = 57

P (picking bowl A =1/2= P(picking bowl B)

We want P( Picking bowl B l red picked) Use Bayes’ Theorem

 P(B I R)= P(B ) P(R I B) /( P(A) .P (R I A) + P(B). P ( R I B)

Complete

Suppose you want to find P (bowl B being chosen given white ball came up = P(B I W )

Complete

HW 5 Prof. Rotando’s great medical example.