

CMSC 203 Spring 2003 Examination 3

1. (a) How many license plates can a state produce if the plates can contain 6 characters (from 26 letters and 10 digits) if they can only use one digit?
(b) How many ways can Mr. Paul choose 6 students from a class of 15 Boys and 12 Girls, if he must choose at least 5 boys?
(c) How many orderings are there of the letters of the word *STRAWBERRYALARMCLOCK* ?
(d) How many ways can I seat 12 people around a circular table, if a certain pair of people cannot sit next to one another?
(e) How many ways can I fill a box of 50 chocolates from 10 types if I must have at least 1 of each type in the box?

2. Let R be the relation on \mathbf{Z} given by $R = \{(a,b) \mid a,b \in \mathbf{Z} \text{ and } a \equiv b \pmod{5}\}$.

- (a) Prove the R is Reflexive. (b) Prove the R is Symmetric.
(c) Prove the R is Transitive. (d) Describe the partition of \mathbf{Z} induced by R .

Let S be the relation on $\{1,2,3,4,5\}$ given as

$$S = \{(1,1),(1,3),(1,4),(2,1),(2,4),(3,1),(3,2),(3,3),(3,4),(3,5),(4,2),(4,5),(5,3),(5,4),(5,5)\}$$

- (e) Graph S^{-1} . (f) Find M_S , the Matrix of S . (g) Find $M_S \circ M_{S^{-1}}$

(h) For the database whose entries form the following table:

Make	Model	Year	Engine ID	Vehicle ID	Color
Ford	Mustang	1972	A1222	FO13579	Black
Ford	Fiesta	1989	C54322	FO24245	Yellow
Chevy	Camaro	1991	754342AH	CH172389	Black
Chevy	Caprice	1989	442355CC	CH156738	Yellow
Olds	Cutlass	1992	ANDU33	OL64332	Blue
Olds	Cutlass	1992	ANGH28	OL61998	White
Volvo	P1800	1969	44325XX	VO44526	White
Volvo	240	1986	53526PD	VO64690	Black
Volvo	760	1992	578868R	VO83529	Blue

find the Primary Keys and $P_{3,6}$

3. (a) For a collection of 80 coins, if 53 are quarters, 15 are quarters from the 1990's, and 24 are coins from the 1990's, what is the probability the a coin chosen at random is a quarter or is a coin from the 1990's?

(b) What is the probability that a family with 3 children have 3 boys given they have at least 1 boy?

4. (a) Find the truth table for the Boolean Polynomial $F(w,x,y,z) = wx'z + xy'$

(b) Find the Disjunctive Normal Form of the polynomial in part (a).

(c) Find the Conjunctive Normal Form of the polynomial in part (a).