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DISCRETE STRUCTURES Junaid Gükax TUTORIAL - 2 G0004190057 as Given that the student has prepared, the probability a passing a certain entrance emam is 0.99. Given that the student did not prepare, the probability of passing the certain entrance enam is 0.05. Assume that the probability of preparing is 0.7. The student yails in the eman what is the probability that he/she did not prepare. ANS 1 let A be the event that a student propages for the emamination; let B be the event that a student passes the enamination. we are given the following information: : P(BIA) = 0.99 P(BIA') = 0.05 P(A) = 0.7P(B'|A') = 1 - P(B|A) = 1 - 0.99 = 0.01 P(B'|A') = 1 - P(B|A') = 1 - 0.05 = 0.95P(A') = 1 - P(A) = 1 - 0.7 = 0.3: Probability that a student has not prepared for the emamination given that the student jailed the emamination $P(A'|B') = P(A' \cap B') = P(B'|A') P(A')$ $P(B') \qquad P(B'|A) P(A) + P(B'|A') P(A')$ = (0.95)(0.3) (0.0)(0.7) + (0.95)(0.3) - 0.97603

* 2 × 3 * 7	Cart and the second of the sec
8.2	Using Pigeonhole principle, show that
	(i) in any soom of people who have been doing some
	handshaking, there will always be atleast two people
1 1 21 125	who have shaken hands the same number of times
	programme and the second of th
ANS (i)	let there be N people in the 200m. A person can
	shake hands with between 0 to N-1 people since you
	cannot shake hands with yourself. That is N possibilities.
2011	I one person has shaken hands with everyone else.
-	men mede is no one who hasht shook hands with
	no one. And the other way around. so 0 and N-1
ed A. Talaya	possibilities are mutual enclusive. So we are down to
- A	N-1 possibilities of people each person can shake hands
	with.
	So if there are N people and N-1 possibilities to the
	number of people each person can shake hands
	with at least 2 people have shook hands with an
	equal amount of people
/: \	A 1
(11)	A bag contains 10 red marbles, 10 white marbles,
	and U10 blue marbles what is the minimum no of
	marbles you have to choose randomly from the bag to
	ensure that we get 4 marbles of same colose.
2110	ale a colone (N) = 2
HN2 (II)	No of colores (n) = 3
(YATT)	No of moxbles $(K+1) = 4 \implies K = 3$
	Minimum no g maxbles required = Kn + 1
	Ko +1 - 2(2) +1 -12
	$K_0 + 1 = 3(3) + 1 = 10$

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17	
1, 24	SACIFORIA = Ed-orithin + 2 + 2 h & Ranking
	Kn + 1 = 4
	number of the second of the se
	i i a a con orio
	Kn + 1 = 4 [considering worst case scentaro]
	Kn + 1 = 10
	The state of the s
	= 3 red + 3 white + 3 blue + 1 (red or white or blue) = 10
	3 (m) + 3 (m)
-	A = (1+12)21 + (1+18) + + (2+1) + (1)2
9,3	use mathematical induction to show that
ď	$1 + 5 + 9 + \cdots + 4n - 3 = n(2n - 1)$
ANS i)	
////	P(1) = 1(2) - 1 = 1 which is true
	Hence P(1) is true
	consider is true
	:. P(K): 1+5+9++(4K-3) = K(2K-1) →1
	THE PROPERTY OF THE PROPERTY O
	Now n = K+1
-0	: P(K+1) = 1+5+9+ + (4K-3) + [4(K+1)-3] = (K+1)(2K+1)
	$K(2K-1) + 4K+1 = 2k^2 + 3K + 1$
	$2k^{2} + 3k + 1 = 2k^{2} + 3k + 1$
	Man . LHS = RHS & (M) 4 Endi-
	Hence P(K+1) is true whenever P(K) is true.
	· By principle of mathematical induction P(n) is
	: By principle of mathematical induction P(n) is true for any natural number.
	21012

ii) 2 + 5 + 8 + ... + (3n-1) = n(3n+1)/2

ANS (ii) checking for n = 1 if P(n) is true.

P(1) = 2 = 1(4)/2 = 2

·. 2 = 2

· P(n) is true por n=1

lets theck P(n) for n=K is true

.. $P(K) = 2 + 5 + 8 + ... + (3K-1) = K(3K+1) \div 2$

To prove P(K+1) is true

P(K+1) = 2+5+8+ ... + (3K-1) + 3K+2 = (K+1)(3K+4)/2

(3k+1)/2 + 3k+2 = (k+1)(3k+4)/2

kirkai kairamakkem su e

3 k2 + K + 6K + 4 = 3 K2 + 7K (+ 4 ...

 $3K^{2} + 7K + 4 = 3K^{2} + 7K + 4$

: US = RHS

.: P(n) is true for n = K+1

Thus, p(n) is true for all n EN

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94	(i) Two dice are scolled, find the probability that the
	we sum it is not in make the mane to are some the the
3,5	a) Equal to 1 mg sollions mil line lossiste # 3
1	6) Equal to 41 & convert of willington and i
	c) less than 13
ANS (i)	70tal possible outcomes = 62 = 36
	Letter Bed pens - Q - Quest determ
	a] Sum is equal to 1
	: Favourable outcome = 0 [Not possible]
	:: Required probability = 0 = 0,
0 1	0 8xx - 20 2 2 3x 2 36 5 0 0 (310x 5 x 25 13 2 5 x 5
17.5	9 2 4 2 6
	b] Sum is equal to 4
	: Favourable outcomes = 3 [(1,3), (2,2), (3,1)]
	: Required probability = 3 = 1 36 12
	e i pe a maj e mil terromado ja cardidat da .
	c] Sum is less than 13
	: Favourable outcomes = 36 [Au ale less than 13]
	: Required probability = 36 = 1
	8 1 2
	v = 3

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	V baie. 1 1
(ii)	A pack contains 4 blue, 2 ned and 3 black pens.
	I 2 pens are drawn at random from the pack.
	Not replaced and then another pen is drawn. what
-	is the probability of decawing 2 blue pens and
	1 black pen.
ANS (ii)	Total Blue pens = 4
	Total Red pens = 2

Total Red pens = 2

Total Black pens = 3

Total pens = 4 + 2 + 3 = 9

Probability of drawing 2 blue pens = $\frac{4C_2}{9C_2} = \frac{4\times3}{9\times8} = \frac{1}{9}$

Since pens axe not xeplaced,

:: Probability of drawing 1 black pen = 3c1 = 3 -> 2

Probability of drawing 2 blue pens and 1 black pen

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		- 11	
	85	i)	How many jour digits can be jormed out of digits
	ikowy.		1,2,3,4,5,6,7,8,9 if no digit is repeated twice?
		-	How many of these will be greater than 3000
		ίì	In how many ways can a committee of three jaculty
			members and 2 students can be formed from 7 jaculty
			members and 8 students.
-		(iii	A bon contains 6 white balls and 5 red balls In how
)	many ways can 4 balls be drown from the bon if:
			a) they are of any color
		-	b] Au the balls are of same colore.
	0		9896
	ANS	Si	Four digit number.
	4.0	D.	si sila availata ha thausand's place: 9
			pigits available of hundred's place 9-1-8
			nigits available for tenth's place \$8-1=7
			Digits available for units place : 7-1-6
			AND SAME SAME SAME OF SAME SAME SAME SAME SAME SAME SAME SAME
	2	Jp.	Hence total combinations = 9×8 × 7×6 = 3024 -> 1
		5	i) no digit is repeated twice
			- 0 × 25 × 2 -
		21	NUMBERS GREATER THAN 3000:
	2.) (EC	we first lind numbers lesser than 3000. Such numbers
	th n	ebi	nill have 1,2 in their thousands place
			: when 1 is jimed in the thousands place: Number of
			available combinations are 8x7x6 since 7 is arready
			fined in thousands place and we cant repeat digits-
			: Numbers having 1 in thousands place = 8×7×6 = 336
			to the thousands place = 8x7x6 = 336
			:. Numbers having 2 in mousting 5 page .: Total numbers less than 3000 = 336 + 336 = 672 -> 2
_			16um 17Mmoos 1035
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	SS STEPPERSON, makes districted for formed bleuting details
3	:. Total numbers greater than 3000 = Total numbers -
	Total numbers lesser than 3000
pd pd	the transfer of the state of th
Y.	: From (1) and (2)
5.0	Total numbers greater than 3000 = 3024 - 672 = 2352
	: 3024 numbers can be formed using the digits
	1,2,3,4,5,6,7,8,9 and out of these, 2352 numbers are greater than 3000.
aring since	- Standard Con Visit C 200
ANS 11)	3 faculty members can be selected from 7 faculty members in 7C_3 ways = 35 ways \rightarrow (1)
	2 students can be selected from 8 students in
	8C2 ways = 28 ways -> (ii)
0	${}^{8}C_{2}$ ways = 28 ways \longrightarrow (ii) \therefore Waye to select 3 faculty members and 2 students from 7 faculty members and 8 students = ${}^{7}C_{3} \times {}^{8}C_{2}$ = 35 × 28
	from 7 faculty members and 8 students = 7c3 > 8c2
	1 0006 harr status = 980 ways.
2013	:. There are 980 ways to select 3 jaculty members
	= 980 ways. There are 980 ways to select 3 jaculty members and 2 students from 7 jaculty members and 8 students.
· Age	deline of banks and and control of shipping the
	The on good ones are borne water about the lines will be
*	na - Desira de Company de la c
	DEED DASKED WEST PLANTING IN IT DON'T RESEMBLE TO SEE

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ANS iii	Number of white balls = n(w) = 6
	Number of red balls = n(R) = 5
a]	Balls are in any colon.
	Hence to select 4 balls from $[n(w) + n(R) = 6 + 5 = 11]$
	11 balls, we have "Cy ways = 330 ways.
	: If the balls can be of any colors, we can draw 4
	balls from 6 white and 5 ned balls in 330 ways.
	0 30003 70017 0 300000 00700 00700
Ы	y all balls are of same colon:
	ways to select white balls = 6Cy *5Co = 15 ways.
0	ways to select white balls = ${}^{6}C_{4} \times {}^{5}C_{0} = 15$ ways. ways to select red balls = ${}^{5}C_{4} \times {}^{6}C_{0} = 5$ ways.
	Hence total ways to select = 15 +5 = 20 ways.
	Thanks to the same of the same
	Hence if all four balls are to be of the same colore,
	there are 20 ways to draw these 4 balls
	from 6 white balls and 5 Hed balls
	U
	ANSWERS: a) 330 ways
	b) 20 ways.
	O
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