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hal 396

- 1) There are 18 mathematics majors and 325 computer science majors at a collage.
 - a) In how many can two representatives be picked so that one is a major and the other is a computer science major?
 - b) In how many ways can one representative be picked who is either a mathematics major or a computer science major?
- 2) An office building contains 27 floors and has 37 offices on each floor. How many offices are in the building?
- 3) A multiple-choice test contains 10 questions. There are four possible answers for each question:
 - a) In how many ways can a student answer the questions on the test if the student answers every question?
 - b) In how many ways can a student answer the questions on the test if the student can leave answers blank?
- 4) A particular brand of shirt comes in 12 colors, has a male version and female version, and comes in three sizes for each sex. How many different types of this shirt are made?
- 5) Six different air lines fly from New York to Denver and seven fly from Denver to San Francisco. How many different pairs of airlines can you choose on which to book a trip from New York to San Francisco via Denver, when you pick an airplane for the flight to Denver and an airplane for the continuation flight to San Francisco?

Hal 405

1. Show that in any set of six classes, each meeting regularly once a week on a particular day of the week, there must be two that meet on the same day, assuming that no classes are held on weekends
2. Show that if there are 30 students in a class, then at least two have last names that begin with the same letter
3. A drawer contains a dozen brown socks and dozen black socks all unmatched. A man takes socks out at random in the dark.
 - a) How many socks must he take out to be sure that he has at least three balls of the same color
 - b) How many socks must he take out to be sure that he has at least two black socks
4. A bowl contains 10 red balls and 10 blue balls. A woman selects balls at random without looking at them.
 - a) How many balls must she select to be sure of having at least three balls of the same color
 - b) How many balls must she select to be sure of having at least three blue balls
5. Show that among any group of five (not necessarily consecutive) integers, there are two with the same remainder when divided by 4.

Hal 413

11. How many...
 - a) ex...
 - b) at
 - c) at
 - d) on
12. How...
 - a) ex
 - b) at
 - c) a
 - d) a
13. A gro...
to a
14. In k
15. In
fro

Hal 413

11. How many bit strings of length 10 contain

- a) exactly four 1s?
- b) at most four 1s?
- c) at least four 1s?
- d) an equal number of 0s and 1s?

12. How many bit strings of length 12 contain

- a) exactly three 1s?
- b) at most three 1s?
- c) at least three 1s?
- d) an equal number of 0s and 1s?

13. A group contains n men and n women. How many ways are there to arrange these people in a row if the men and women alternate?

14. In how many ways can a set of two positive integers less than

15. In how many ways can a set of five letters be selected from the English alphabet?

6. How many ways are there to select five unordered elements from a set with three elements when repetition is allowed?
7. How many ways are there to select three unordered elements from a set with five elements when repetition is allowed?
8. How many different ways are there to choose a dozen donuts from the 21 varieties at a donut shop?
9. A bagel shop has onion bagels, poppy seed bagels, egg bagels, salty bagels, pumpernickel bagels, sesame seed bagels, raisin bagels, and plain bagels. How many ways are there to choose
- six bagels?
 - a dozen bagels?
 - two dozen bagels?
 - a dozen bagels with at least one of each kind?
 - a dozen bagels with at least three egg bagels and no more than two salty bagels?
10. A croissant shop has plain croissants, cherry croissants, chocolate croissants, almond croissants, apple croissants, and broccoli croissants. How many ways are there to choose
- a dozen croissants?
 - three dozen croissants?
 - two dozen croissants with at least two of each kind?
 - two dozen croissants with no more than two broccoli croissants?
 - two dozen croissants with at least five chocolate croissants and at least three almond croissants
 - two dozen croissants with at least one plain croissants, at least two cherry croissants, at least three chocolate croissants, at least one almond croissants, at least two apple croissants, and no more than three broccoli croissants?

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Jawaban

HAL 396

- 1) a) Diket : Math = 18
Comp science = 325

$$\begin{aligned}\text{cara memilih} &= \text{Math} \times \text{Comp science} \\ &= 18 \times 325 \\ &= \underline{\underline{5850}}\end{aligned}$$

- b) Cara memilih seseorang dari dua jurusan = Math + Comp Science
 $= 18 + 325$
 $= \underline{\underline{343}}$

- 2) Diket : 27 Lantai
37 kantor disetiap lantai

$$\begin{aligned}\text{banyak kantor} &= 27 \text{ Lantai} \times 37 \text{ kantor disetiap lantai} \\ &= 27 \times 37 \\ &= \underline{\underline{999}}\end{aligned}$$

- 3) a) Diket : 10 Pertanyaan
4 jawaban untuk setiap jawaban

$$\begin{aligned}\text{satu pertanyaan 4 jawaban dan ada 10 pertanyaan} \\ \text{cara menjawab} &= 4^{10} \\ &= 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \\ &= \underline{\underline{1.048.576}}\end{aligned}$$

- b) 4 Pilihan 7 jawaban kosong

$$4 + 1 = 5$$

$$\begin{aligned}\text{Cara menjawab jika ada jawaban kosong} &= 5^{10} \\ &= \underline{\underline{9.765.625}}\end{aligned}$$

- 4) Diket : 12 warna
Laki-laki dan Perempuan
3 ukuran setiap jenis kelamin

$$\begin{aligned}\text{jenis kemeja yang dibuat} &= 12 \times 2 \times 3 \\ &= \underline{\underline{72}}\end{aligned}$$

- 5) Diket : 6 New York - Denver
7 Denver - Francisco

Berapa banyak maskapai New York - Francisco ?
 $= 6 \times 7$
 $= 42 \text{ Maskapai}$

Hal 405

- 1) Mari kita tunjukkan bahwa dalam himpunan enam kelas, setiap pertemuan rutin seminggu pada hari tertentu dalam seminggu, harus ada dua pertemuan pada hari yang sama dengan asumsi tidak ada kelas yang diadakan pada akhir pekan. Karena ada 5 hari kerja dalam seminggu dan 6 kelas, berdasarkan Prinsip Pigeonhole harus ada dua hari kerja yang bertemu pada hari yang sama.
- 2) Mari kita tunjukkan bahwa jika ada 30 siswa dalam satu kelas, maka paling sedikit dua orang mempunyai nama belakang yang diawali dengan huruf yang sama. Mengingat terdapat 26 huruf besar dalam alfabet bahasa Inggris dan 30 siswa dalam satu kelas, maka berdasarkan Prinsip Pigeonhole harus ada setidaknya dua yang memiliki nama belakang yang diawali dengan huruf yang sama.

- 3) Diket : 12 Coklat
12 Hitam

a) Dalam hal ini, kita dapat menerapkan Prinsip Pigeonhole dengan memikirkan warna-warna kotak yang disebutkan dalam prinsip tersebut. Jadi berdasarkan sarang merpati, maka $n=2$ karena jika orang mengambil paling sedikit $n+1=3$ kaos kaki, maka dapat dipastikan sepasang kaos kaki yang berwarna sama ikut terambil. Jika hanya mengambil 2 buah kemungkinan dua buah warna yang berbeda terambil. Jadi 3 kaos kaki adalah jumlah minimum yang harus diambil dari dalam laci untuk menjamin terambil sepasang warna yang sama.

b) Untuk memastikan bahwa setidaknya dua kaos kaki hitam. Jadi, dia harus mengeluarkan 19 kaos kaki untuk memastikan bahwa dua diantaranya berwarna hitam.

4.) a.) Untuk memastikan bahwa setidaknya tiga bola yang berwarna sama. 4 bola saja tidak cukup, karena bisa mengambil dua bola biru dan dua bola merah. Maka 5 bola sudah cukup, karena menurut prinsip merpati akan selalu memiliki setidaknya 3 merah atau setidaknya 3 bola warna biru.

b.) Untuk memastikan bahwa setidaknya tiga bola berwarna biru. Dia harus mengeluarkan 13 bola untuk memastikan bahwa tiga diantaranya berwarna biru.

5) Ada empat kemungkinan sisa jika suatu bilangan bulat dibagi 4: 0, 1, 2, 3 (Prinsip Pigeonholes). Oleh karena itu, berdasarkan prinsip pigeonholes setidaknya ada dua ($= \lceil \frac{5}{4} \rceil$) dari lima sisa yang diberikan harus sama.

Hal 915

11) a) 

$$\begin{aligned}C(10,4) &= \frac{10!}{4!(10-4)!} = \frac{10!}{4!6!} \\&= \frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2 \times 1} \\&= 210\end{aligned}$$

b) $C(10,4) + C(10,3) + C(10,2) + C(10,1) + C(10,0)$

$$C(10,4) = \frac{10!}{4!(10-4)!} = 210$$

$$\begin{aligned}C(10,3) &= \frac{10!}{3!(10-3)!} = \frac{10 \times 9 \times 8}{3 \times 2 \times 1} \\&= 120\end{aligned}$$

$$\begin{aligned}C(10,2) &= \frac{10!}{2!(10-2)!} = \frac{10 \times 9}{2 \times 1} \\&= 45\end{aligned}$$

$$\begin{aligned}C(10,1) &= \frac{10!}{1!(10-1)!} = \frac{10}{1} \\&= 10\end{aligned}$$

$$C(10,0) = \frac{10!}{0!(10-0)!} = 1$$

$$\begin{aligned}&= 210 + 120 + 45 + 10 + 1 \\&= 386\end{aligned}$$

$$c) = c(10,4) + c(10,5) + c(10,6) + c(10,7) + c(10,8) + c(10,9) + c(10,10)$$

$$= c(10,4) = \frac{10!}{4!(10-4)!} = 210$$

$$= c(10,5) = \frac{10!}{5!(10-5)!} = 252$$

$$= c(10,6) = \frac{10!}{6!(10-6)!} = 210$$

$$= c(10,7) = \frac{10!}{7!(10-7)!} = 120$$

$$= c(10,8) = \frac{10!}{8!(10-8)!} = 45$$

$$= c(10,9) = \frac{10!}{9!(10-9)!} = 10$$

$$= c(10,10) = \frac{10!}{10!(10-10)!} = 1$$

$$= 210 + 252 + 210 + 120 + 45 + 10 + 1$$

$$= 848$$

$$d.) c(10,5) = \frac{10!}{5!(10-5)!} = 252$$

$$12) a) C(12,3) = \frac{12!}{3!(12-3)!} = \frac{12!}{3! 9!} = \underline{\underline{220}}$$

$$b) C(12,3) + C(12,2) + C(12,1) + C(12,0)$$

$$C(12,2) = \frac{12!}{2!(12-2)!} = \underline{\underline{66}}$$

$$C(12,1) = \frac{12!}{1!(12-1)!} = \underline{\underline{12}}$$

$$C(12,0) = \frac{12!}{0!(12-0)!} = \underline{\underline{1}}$$

$$= 220 + 66 + 12 + 1$$

$$= \underline{\underline{299}}$$

$$c) C(12,3) + C(12,4) + C(12,5) + C(12,6) + C(12,7) + \dots + C(12,12)$$

$$C(12,4) = \frac{12!}{4!(12-4)!} = \underline{\underline{495}}$$

$$C(12,5) = \frac{12!}{5!(12-5)!} = \underline{\underline{792}}$$

$$C(12,6) = \frac{12!}{6!(12-6)!} = \underline{\underline{924}}$$

$$C(12,7) = \frac{12!}{7!(12-7)!} = \underline{\underline{792}} \quad = 220 + 495 + 792 + 924 + 792 + 495$$

$$C(12,8) = \frac{12!}{8!(12-8)!} = \underline{\underline{495}} \quad = 4017$$

$$C(12,9) = \frac{12!}{9!(12-9)!} = \underline{\underline{220}}$$

$$C(12,10) = \frac{12!}{10!(12-10)!} = \underline{\underline{66}}$$

$$C(12,11) = \frac{12!}{11!(12-11)!} = \underline{\underline{12}}$$

$$C(12,12) = \frac{12!}{12!(12-12)!} = \underline{\underline{1}}$$

$$d) c(12,6) = \frac{12!}{6!(12-6)!} = \underline{\underline{924}}$$

- 13) mengurutkan pria $n!$ cara
mengurutkan wanita $m!$ cara

Anda dapat menyatukan dua tersebut sehingga jenis kelaminnya bergantian. Dapat dilakukan dalam 2 cara, tergantung pada apakah meletakkan seorang pria atau wanita di ujung kiri baris. Sehingga dapat digabungkan dalam $2 \cdot n! \cdot m! = 2(n!)^2$ cara

14) $n = 99$

$r = 2$

$$c(99,2) = \frac{99!}{2!(99-2)!} = \frac{99 \times 98 \times 97}{(2 \times 1)(97)} \\ = \frac{9702}{2} \\ = \underline{\underline{4851}}$$

15) $n = 26$

$r = 5$

$$c(26,5) = \frac{26!}{5!(26-5)!} = \frac{26 \times 25 \times 24 \times 23 \times 22 \times 21}{(5 \times 4 \times 3 \times 2 \times 1)(21)} \\ = \underline{\underline{65780}}$$

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6) $n = 3$
 $r = 5$

$$\frac{(n+r-1)!}{r!(n-1)!} = \frac{(3+5-1)!}{5!(3-1)!}$$

$$= \frac{7!}{5! \cdot 2!} = \underline{\underline{21}}$$

Ho

1) a)

$$7) \quad n=5 \\ r=3$$

$$\frac{(n+r-1)!}{r!(n-1)!} = \frac{(5+3-1)!}{3!(5-1)!} = \frac{7!}{3!4!} = 35$$

$$8) \quad n=21 \\ r=12$$

$$\frac{(n+r-1)!}{r!(n-1)!} = \frac{(21+12-1)!}{12!(21-1)!} = \frac{32!}{12!20!} = 225.792.840$$

$$9) \quad a) \quad n=8 \\ r=6$$

$$c(n+r-1, r) = \frac{(n+r-1)!}{r!(n-1)!} = \frac{13!}{6!(8-1)!} = \frac{13!}{6!7!} = 1716$$

$$b) \quad n=8 \\ r=12$$

$$c(8+12-1, 12) = \frac{19!}{12!(8-1)!} = 50388$$

$$c) \quad n=8 \\ r=24$$

$$c(8+24-1, 24) = \frac{31!}{24!(8-1)!} = 2629575$$

$$d) \quad n=8 \\ r=4$$

$$c(8+4-1, 4) = \frac{11!}{4!(8-1)!} = 330$$

e) Tidak ada bakteri asin!

$$n=7(8-1), r=9(12-3 \text{ telur})$$

$$c(7+9-1, 9) = \frac{15!}{9!(7-1)!} = 5005$$

(9)

1 bagel asin

$$n=7 \quad r=8(12-3 \text{ telur} - 1 \text{ asin})$$

$$c(7+8-1, 8) = \frac{14!}{8!(7-1)!} = 3003$$

2 bagel asin

$$n=7 \quad r=7(12-3 \text{ telur} - 2 \text{ asin})$$

$$c(7+7-1, 7) = \frac{13!}{7!(7-1)!} = 1716$$

$$= 5005 + 3003 + 1716$$

$$= 9724$$

10) a) $n=6$
 $r=12$

$$c(n+r-1, r) = \frac{(n+r-1)!}{r!(n-1)!}$$

$$c(6+12-1, 12) = \frac{(6+12-1)!}{12!(6-1)!} = \frac{17!}{12! \cdot 5!} = 6188$$

b) $n=6$

$$r=36$$

$$c(6+36-1, 36) = \frac{41!}{36!(6-1)!} = 749398$$

c) $n=6$

$$r=24-12$$

$$c(6+12-1, 12) = \frac{17!}{12!(6-1)!} = 6188$$

d) 0 brokoli
 $n=5, r=24$

$$c(5+24-1, 24) = \frac{28!}{24!(5-1)!} = 20.475$$

1 brokoli
 $n=5, r=23 (24-1)$

$$c(5+23-1, 23) = \frac{27!}{23!(5-1)!} = 17.550$$

2 brokoli
 $n=5, r=22 (24-2)$

$$c(5+22-1, 22) = \frac{26!}{22!(5-1)!} = 14.950$$

$$= 20.475 + 17.550 + 14.950 = 52.975$$

e) $n=6$
 $r=16 (24-5-3)$

$$c(6+16-1, 16) = \frac{21!}{16!(6-1)!} = 20.349$$

f) 0 brokoli
 $n=5$

$r=15 (24-1-2-3-1-2)$

$$c(5+15-1, 15) = \frac{19!}{15!(5-1)!} = 3876$$

1 brokoli
 $n=5$
 $r=14$

$$c(5+14-1, 14) = \frac{18!}{14!(5-1)!} = 3060$$

2 brokoli

$$n = 5$$

$$r = 13$$

$$C(5+13-1, 13) = \frac{17!}{13!(5-1)!} = 2380$$

3 brokoli

$$n = 5$$

$$r = 12$$

$$C(5+12-1, 12) = \frac{16!}{12!(5-1)!} = 1820$$

$$= 3876 + 3060 + 2380 + 1820$$

$$= \underline{\underline{11136}}$$