Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 8th edition
Extra Examples
Section 6.1—The Basics of Counting

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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p.406, icon at Example 1
#1. There are three available flights from Indianapolis to St. Louis and, regardless of which of these flights is taken, there are five available flights from St. Louis to Dallas. In how many ways can a person fly from Indianapolis to St. Louis to Dallas?

See Solution

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p.406, icon at Example 1
#2. A certain type of push-button door lock requires you to enter a code before the lock will open. The lock has five buttons, numbered $1, 2, 3, 4, 5$.

(a) If you must choose an entry code that consists of a sequence of four digits, with repeated numbers allowed, how many entry codes are possible?
(b) If you must choose an entry code that consists of a sequence of four digits, with no repeated digits allowed, how many entry codes are possible?

See Solution

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p.406, icon at Example 1
#3. Count the number of print statements in this algorithm:

for $i := 1$ **to** n
begin
  for $j := 1$ **to** n
    print "hello"

```
   for k := 1 to n
      print "hello"
end
```

See Solution

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p.406, icon at Example 1

#4. Count the number of print statements in this algorithm:

```
for i := 1 to n
begin
   for j := 1 to i
      print "hello"
   for k := i + 1 to n
      print "hello"
end
```

See Solution

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p.411, icon at Example 15

#1. Find the number of strings of length 10 of letters of the alphabet, with no repeated letters, that contain no vowels.

See Solution

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p.411, icon at Example 15

#2. Find the number of strings of length 10 of letters of the alphabet, with no repeated letters, that begin with a vowel.

See Solution

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p.411, icon at Example 15
#3. Find the number of strings of length 10 of letters of the alphabet, with no repeated letters, that have C and V at the ends (in either order).

See Solution

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p.144, icon at Example 15
#4. Find the number of strings of length 10 of letters of the alphabet, with repeated letters allowed, that have vowels in the first two positions.

See Solution

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p.411, icon at Example 15

#5. Find the number of strings of length 10 of letters of the alphabet, with no repeated letters, that have vowels in the first two positions.

See Solution

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p.411, icon at Example 15

#6. Ten men and ten women are to be put in a row. Find the number of possible rows.

See Solution

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p.411, icon at Example 15

#7. Ten men and ten women are to be put in a row. Find the number of possible rows if no two of the same sex stand adjacent.

See Solution

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p.411, icon at Example 15

#8. Ten men and ten women are to be put in a row. Find the number of possible rows if Beryl, Carol, and Darryl want to stand next to each other in some order (such as Carol, Beryl, and Darryl, or Darryl, Beryl, and Carol).

See Solution

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p.413, icon at Example 18

#1. Find the number of integers from 1 to 400 inclusive that are:

(a) divisible by 6.
(b) not divisible by 6.

See Solution

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p.413, icon at Example 18

#2. Find the number of integers from 1 to 400 inclusive that are:

(a) divisible by 6 and 8.
(b) divisible by 6 or 8.

See Solution

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p.413, icon at Example 18

#3. Find the number of strings of length 10 of letters of the alphabet, with repeated letters allowed,

(a) that begin with C and end with V.
(b) that begin with C or end with V.

See Solution

Show All Solutions

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Extra Examples
Section 6.2—The Pigeonhole Principle

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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p.422, icon at Example 4
#1. Prove that in any group of three positive integers, there are at least two whose sum is even.

See Solution

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p.422, icon at Example 4
#2. If positive integers are chosen at random, what is the minimum number you must have in order to guarantee that two of the chosen numbers are congruent modulo 6.

See Solution

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p.422, icon at Example 4
#3. Suppose you have a group of n people $(n \geq 2)$. Use the Pigeonhole Principle to prove that there are at least two in the group with the same number of friends in the group.

See Solution

p.422, icon at Example 4

#4. Prove that in any set of 700 English words, there must be at least two that begin with the same pair of letters (in the same order), for example, STOP and STANDARD.

See Solution

p.423, icon at Example 6

#1. Each type of machine part made in a factory is stamped with a code of the form "letter-digit-digit", where the digits can be repeated. Prove that if 8000 parts are made, then at least four must have the same code stamped on them.

See Solution

p.423, icon at Example 6

#2. Each student is classified as a member of one of the following classes: Freshman, Sophomore, Junior, Senior. Find the minimum number of students who must be chosen in order to guarantee that at least eight belong to the same class.

See Solution

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p.423, icon at Example 6

#3. What is the minimum number of cards that must be drawn from an ordinary deck of cards to guarantee that you have been dealt

(a) at least three of at least one rank?
(b) at least three aces?
(c) the ace of diamonds?

See Solution

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p.423, icon at Example 6

#4. What is the minimum number of cards that must be drawn from an ordinary deck of cards to guarantee that you have been dealt

(a) at least three of at least one suit?
(b) at least three clubs?

See Solution

Show All Solutions

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Extra Examples
Section 6.3—Permutations and Combinations

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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p.429, icon at Example 1

#1. A class has 30 students enrolled. In how many ways can:

(a) four be put in a row for a picture?
(b) all 30 be put in a row for a picture?
(c) all 30 be put in two rows of 15 each (that is, a front row and a back row) for a picture?

See Solution

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p.429, icon at Example 1

#2. A class has 20 women and 16 men. In how many ways can you

(a) put all the students in a row?
(b) put 7 of the students in a row?
(c) put all the students in a row if all the women are on the left and all the men are on the right?

See Solution

p.434, icon at Example 12

#1. A certain type of push-button door lock requires you to enter a code before the lock will open. The lock has five buttons, numbered $1, 2, 3, 4, 5$. The lock is programmed to recognize six different 4-digit codes, with repeated digits allowed in each code. How many different sets of recognizable codes are there?

See Solution

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p.434, icon at Example 12

#2. Several states play a lottery game called Mega Millions. On a Mega Millions lottery game ticket, you pick a set of five numbers from the numbers 1 through 56 on the top panel of the ticket, and one number (the Mega Ball number) from 1 through 46 on the bottom half of the ticket. (The Mega Ball number can be the same as one of the five numbers picked on the top half of the ticket.) A set of six winning numbers is selected: five numbers from 1 through 56 and one Mega Ball number from the numbers 1 through 46. You win a prize if your selections match some or all of the winning numbers, as follows: five and Mega Ball, five and no Mega Ball, four and Mega Ball, four and no Mega Ball, three and Mega Ball, three and no Mega Ball, two and Mega Ball, one and Mega Ball, only the Mega Ball.

Find the number of ways in which you can have one ticket with

(a) five winning numbers, but no Mega Ball.
(b) two winning numbers and the Mega Ball.

See Solution

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p.434, icon at Example 12

#3. How many ways are there to choose a committee of size five consisting of three women and two men from a group of ten women and seven men?

See Solution

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p.434, icon at Example 12

#4. Let $S = \{1, 2, \ldots, 19\}$. Find the number of subsets of S with equal numbers of odd integers and even integers.

See Solution

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p.434, icon at Example 12

#5. Find the number of words of length 10 of letters of the alphabet, with no repeated letters, such that each word has equal numbers of vowels and consonants.

See Solution

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p.434, icon at Example 12

#6. Find the number of ways to take an ordinary deck of 52 playing cards and break it into:

(a) four equal piles, labeled A, B, C, D.

(b) four equal piles that are not labeled.

See Solution

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p.434, icon at Example 12

#7. Suppose $S = \{1, 2, \ldots, 25\}$. Find the number of subsets $T \subseteq S$ of size five such that T consists of two odd numbers and three even numbers.

See Solution

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p.434, icon at Example 12

#8. Suppose $S = \{1, 2, \ldots, 25\}$. Find the number of subsets $T \subseteq S$ of size five such that T consists of exactly three prime numbers.

See Solution

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p.434, icon at Example 12

#9. Suppose $S = \{1, 2, \ldots, 25\}$. Find the number of subsets $T \subseteq S$ of size five such that T has the sum of its elements less than 18.

See Solution

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p.434, icon at Example 12

#10. Suppose $S = \{1, 2, \ldots, 25\}$. Find the number of subsets $T \subseteq S$ of size five such that T has at least one even number in it.

See Solution

Show All Solutions

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Extra Examples
Section 6.4—Binomial Coefficients

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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p.438, icon at Example 2
#1. Write the expansion of $(x + 2y)^3$.

See Solution

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p.438, icon at Example 2
#2. Find the coefficient of $a^{17}b^{23}$ in the expansion of $(3a - 7b)^{40}$.

See Solution

---

p.438, icon at Example 2

#3. Write the expansion of $\left(x^2 - \frac{1}{x}\right)^8$.

See Solution

Show All Solutions

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Extra Examples
Section 6.5—Generalized Permutations and Combinations

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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p.448, icon at Example 4
#1. A jar contains 30 pennies, 20 nickels, 20 dimes, and 15 quarters. (The coins of each denomination are considered to be identical.)

(a) Find the number of ways to put all 85 coins in a row.
(b) Find the number of possible handfuls of 12 coins.

See Solution

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p.488, icon at Example 4
#2. A bakery sells four kinds of cookies: chocolate, jelly, sugar, and peanut butter. You want to buy a bag of 30 cookies. Assuming that the bakery has at least 30 of each kind of cookie, how many bags of 30 cookies could you buy if you must choose:

(a) at least 3 chocolate cookies and at least 6 peanut butter cookies.
(b) exactly 3 chocolate cookies and exactly 6 peanut butter cookies.

See Solution

p.448, icon at Example 4

#3. A bakery sells four kinds of cookies: chocolate, jelly, sugar, and peanut butter. You want to buy a bag of 30 cookies. Assuming that the bakery has at least 30 of each kind of cookie, how many bags of 30 cookies could you buy if you must choose at most 5 sugar cookies.

See Solution

p.448, icon at Example 4

#4. A bakery sells four kinds of cookies: chocolate, jelly, sugar, and peanut butter. You want to buy a bag of 30 cookies. Assuming that the bakery has at least 30 of each kind of cookie, how many bags of 30 cookies could you buy if you must choose at least one of each of the four types of cookies.

See Solution

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p.450, icon at Example 7
#1. In how many ways can the letters in DECEIVED be arranged in a row?

See Solution

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p.450, icon at Example 7
#2. In how many ways can 7 of the 8 letters in CHEMISTS be put in a row?

See Solution

p.451, icon after start of "Distributing Objects into Boxes" subsection
#1. Four players are playing bridge. In how many ways can they be dealt hands of cards? (In bridge, a hand of cards consists of 13 out of 52 cards.)

See Solution

p.451, icon after start of "Distributing Objects into Boxes" subsection
#2. In how many ways can ten books be put in four labeled boxes, if one or more of the boxes can be empty? Assume that the books are:

(a) distinct.
(b) identical.

See Solution

Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 8th edition
Extra Examples
Section 6.6—Generating Permutations and Combinations

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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p.458, icon at Example 2

#1. Place the following permutations of $1, 2, 3, 4, 5, 6$ in lexicographic order:

$$461325, \; 326145, \; 516243, \; 324165, \; 461235, \; 324615, \; 462135.$$

See Solution

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p.458, icon at Example 2

#2. Find the permutation of $1, 2, 3, 4, 5, 6$ immediately after 263541 in lexicographic order.

See Solution

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p.458, icon at Example 2

#3. Find the permutation of $1, 2, 3, 4, 5, 6$ immediately before 261345 in lexicographic order.

See Solution

---

p.458, icon at Example 2

#4. If the permutations of $1, 2, 3, 4, 5, 6$ are put in lexicographic order, with 123456 in position 1, 123465 in position 2, etc., find the permutation in position 362.

See Solution

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p.458, icon at Example 2

#5. If the permutations of 1, 2, 3, 4, 5 are put in lexicographic order, in what position is the permutation 41253?

See Solution
