1. Given a string containing brackets [], braces {}, parentheses (), or any combination thereof, verify that any and all pairs are matched and nested correctly.
2. Given the position of two queens on a chess board, indicate whether or not they are positioned so that they can attack each other.

In the game of chess, a queen can attack pieces which are on the same row, column, or diagonal.

A chessboard can be represented by an 8 by 8 array.

So if you're told the white queen is at (2, 3) and the black queen at (5, 6), then you'd know you've got a set-up like so:

\_ \_ \_ \_ \_ \_ \_ \_

\_ \_ \_ \_ \_ \_ \_ \_

\_ \_ \_ W \_ \_ \_ \_

\_ \_ \_ \_ \_ \_ \_ \_

\_ \_ \_ \_ \_ \_ \_ \_

\_ \_ \_ \_ \_ \_ B \_

\_ \_ \_ \_ \_ \_ \_ \_

\_ \_ \_ \_ \_ \_ \_ \_

You'd also be able to answer whether the queens can attack each other. In this case, that answer would be yes, they can, because both pieces share a diagonal.

1. To try and encourage more sales of different books from a popular 5 book series, a bookshop has decided to offer discounts on multiple book purchases.

One copy of any of the five books costs $8.

If, however, you buy two different books, you get a 5% discount on those two books.

If you buy 3 different books, you get a 10% discount.

If you buy 4 different books, you get a 20% discount.

If you buy all 5, you get a 25% discount.

Note: that if you buy four books, of which 3 are different titles, you get a 10% discount on the 3 that form part of a set, but the fourth book still costs $8.

Your mission is to write a piece of code to calculate the price of any conceivable shopping basket (containing only books of the same series), giving as big a discount as possible.

For example, how much does this basket of books cost?

* 2 copies of the first book
* 2 copies of the second book
* 2 copies of the third book
* 1 copy of the fourth book
* 1 copy of the fifth book

One way of grouping these 8 books is:

* 1 group of 5 --> 25% discount (1st,2nd,3rd,4th,5th)
* +1 group of 3 --> 10% discount (1st,2nd,3rd)

This would give a total of:

* 5 books at a 25% discount
* +3 books at a 10% discount

Resulting in:

* 5 x (8 - 2.00) == 5 x 6.00 == $30.00
* +3 x (8 - 0.80) == 3 x 7.20 == $21.60

For a total of $51.60

However, a different way to group these 8 books is:

* 1 group of 4 books --> 20% discount (1st,2nd,3rd,4th)
* +1 group of 4 books --> 20% discount (1st,2nd,3rd,5th)

This would give a total of:

* 4 books at a 20% discount
* +4 books at a 20% discount

Resulting in:

* 4 x (8 - 1.60) == 4 x 6.40 == $25.60
* +4 x (8 - 1.60) == 4 x 6.40 == $25.60

For a total of $51.20

And $51.20 is the price with the biggest discount.

Exception messages

Sometimes it is necessary to raise an exception. When you do this, you should include a meaningful error message to indicate what the source of the error is. This makes your code more readable and helps significantly with debugging. Not every exercise will require you to raise an exception, but for those that do, the tests will only pass if you include a message.

To raise a message with an exception, just write it as an argument to the exception type. For example, instead of raise Exception, you should write:

raise Exception("Meaningful message indicating the source of the error")

1. Output the lyrics to 'The Twelve Days of Christmas'.

On the first day of Christmas my true love gave to me: a Partridge in a Pear Tree.

On the second day of Christmas my true love gave to me: two Turtle Doves, and a Partridge in a Pear Tree.

On the third day of Christmas my true love gave to me: three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the fourth day of Christmas my true love gave to me: four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the fifth day of Christmas my true love gave to me: five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the sixth day of Christmas my true love gave to me: six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the seventh day of Christmas my true love gave to me: seven Swans-a-Swimming, six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the eighth day of Christmas my true love gave to me: eight Maids-a-Milking, seven Swans-a-Swimming, six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the ninth day of Christmas my true love gave to me: nine Ladies Dancing, eight Maids-a-Milking, seven Swans-a-Swimming, six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the tenth day of Christmas my true love gave to me: ten Lords-a-Leaping, nine Ladies Dancing, eight Maids-a-Milking, seven Swans-a-Swimming, six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the eleventh day of Christmas my true love gave to me: eleven Pipers Piping, ten Lords-a-Leaping, nine Ladies Dancing, eight Maids-a-Milking, seven Swans-a-Swimming, six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

On the twelfth day of Christmas my true love gave to me: twelve Drummers Drumming, eleven Pipers Piping, ten Lords-a-Leaping, nine Ladies Dancing, eight Maids-a-Milking, seven Swans-a-Swimming, six Geese-a-Laying, five Gold Rings, four Calling Birds, three French Hens, two Turtle Doves, and a Partridge in a Pear Tree.

1. Tally the results of a small football competition.

Based on an input file containing which team played against which and what the outcome was, create a file with a table like this:

Team | MP | W | D | L | P

Devastating Donkeys | 3 | 2 | 1 | 0 | 7

Allegoric Alaskans | 3 | 2 | 0 | 1 | 6

Blithering Badgers | 3 | 1 | 0 | 2 | 3

Courageous Californians | 3 | 0 | 1 | 2 | 1

What do those abbreviations mean?

* MP: Matches Played
* W: Matches Won
* D: Matches Drawn (Tied)
* L: Matches Lost
* P: Points

A win earns a team 3 points. A draw earns 1. A loss earns 0.

The outcome should be ordered by points, descending. In case of a tie, teams are ordered alphabetically.

Input

Your tallying program will receive input that looks like:

Allegoric Alaskans;Blithering Badgers;win

Devastating Donkeys;Courageous Californians;draw

Devastating Donkeys;Allegoric Alaskans;win

Courageous Californians;Blithering Badgers;loss

Blithering Badgers;Devastating Donkeys;loss

Allegoric Alaskans;Courageous Californians;win

The result of the match refers to the first team listed. So this line

Allegoric Alaskans;Blithering Badgers;win

Means that the Allegoric Alaskans beat the Blithering Badgers.

This line:

Courageous Californians;Blithering Badgers;loss

Means that the Blithering Badgers beat the Courageous Californians.

And this line:

Devastating Donkeys;Courageous Californians;draw

Means that the Devastating Donkeys and Courageous Californians tied.