

Glasgow 2024

Problem Solving with APL









Format: For each problem...

- Problem statement
- Solve the problem
- We collect and show solutions
- Discussion

(ask if unclear)

(bonus task if you're fast)

(be brave)

(learning opportunity)

It Is All Right

Write a dfn that takes the length of the legs of a triangle as its left argument, and the length of the hypotenuse as its right argument and returns 1 if the triangle is a right triangle, 0 otherwise.

3 4 YourFunction 5
l
2 3 YourFunction 4

Hint: In a right triangle, the square of the hypotenuse equals the sum of squares of the legs.

Being Whole is Overrated

Write a function which selects the non-integer numbers from a numeric vector.

```
YourFunction 14.2 9 3 3.1 0 71.1
14.2 3.1 71.1
YourFunction 1 3 5
```

```
YourFunction 3.1415 2.71828 3.1415 2.71828
```

Bonus task: Keep integers instead

Zero Nulls

Write a function replaces all **NULLs** with 0s in a simple array.

```
YourFunction 1 2 NULL 4 5 6
1 2 0 4 5 6
YourFunction 2 2 2p'A' NULL 'B'
A 0
B A

Penus tasks Handle not
```

Bonus task: Handle nested arrays

Move to the Front

Write a function that, given vector arguments, reorders the right argument so elements in the left argument come first.

```
'rb' YourFunction 'abracadabra'
brbraacadaa
```

42 YourFunction 0

3 YourFunction ,1

1

Bonus task:
Use the order of the left argument:
rrbbaacadaa



What Is In a Word

Write a function which returns the number of words in the given character vector. For simplicity's sake, you can consider the space character ' ' to be the only word separator.

```
YourFunction 'Testing one, two, three'

YourFunction 'many blanks'

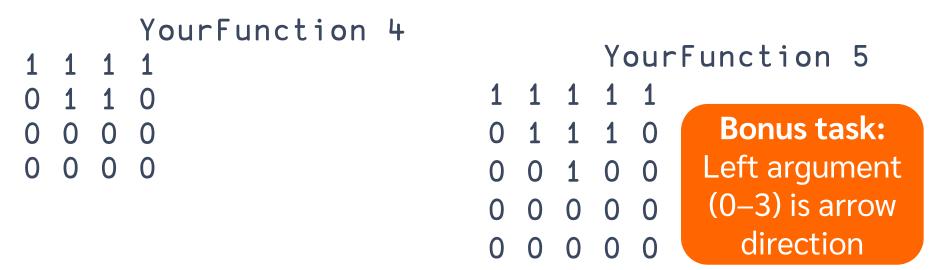
YourFunction ''

YourFunction ''

I Bonus task: Multiple word separators as left argument
```

Like an Arrow

Write a function that takes a size and creates a corresponding Boolean matrix with the top triangle being 1s.



Longest Streak

Write a function that takes a non-empty numeric vector and returns the length of the longest streak of positive growth.

Bonus task: Length of longest streak of consistent growth/stagnation/fall

You're Unique, Just Like Everyone Else

Write a function that takes a vector as its right argument and returns elements that occur only once in the vector.

```
YourFunction 1 2 3 4 5 4 3 2 1 2

5

YourFunction 'bye' 'bye' 'hello' 'world' hello world
```

Bonus task: Sort by ascending frequency

See (Through) Me

Write a replacement for $\underline{\epsilon}$ on simple vectors where the left argument is a pair: what to search for and a Boolean mask vector indicating which elements must match.

Separation Anxiety

Write a function that takes a right argument character vector and a left argument character scalar separator character. It should then insert the separator after every group of 3 characters from the right, but not at the far left.

```
',' YourFunction '123456789'
123,456,789
''YourFunction 'abcde'
ab cde
```

Bonus task:Do it fast!

Chop Chop

A gene has 3×n characters and ends with TAG, TAA, or TGA.

Chop the given character vector into genes.

```
s+'TAG' 'TAA' 'TGA'

□RL+4
□+g+ε{ω≥4:'ACTG'[?3ρ4] ◊ ω¬s}"?10ρ8

GTCCTAACCTAATTATGATAACGGCCGTAA

YourFunction g

GTCCTAACCTAA TTATGA TAA CGGCCGTAA
```

Keeping Things In Balance

Write a function which returns a 1 if the opening and closing parentheses in a character vector are balanced, or a zero otherwise.

```
YourFunction '((2×3)+4)' → 1
YourFunction 'hello world!' → 1
YourFunction ')(2×3)+/4(' → 0
YourFunction '(()' → 0
```

Bonus task:
Handle
[] too!

Thank you for playing!

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