DYALOG

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Problem Solving with APL

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Format: For each problem…

- Problem statement (ask if unclear)
- Solve the problem (bonus task if you're fast)
- We collect and show solutions (be brave)
- Discussion (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
1
      2 3 YourFunction 4
0
```

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 ¯1.1
14.2 3.1 ¯1.1
      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 2⍴'A' ⍬NULL 'B'
A 0
B A

0 B
A 0
```

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 ⍬

      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'
4
      YourFunction ' many  blanks '
2
      YourFunction ''
0
```

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.

```
      YourFunction 4
1 1 1 1
0 1 1 0
0 0 0 0
0 0 0 0
```

```
      YourFunction 5
1 1 1 1 1
0 1 1 1 0
0 0 1 0 0
0 0 0 0 0
0 0 0 0 0
```

Bonus task: Left argument (0–3) is arrow direction

Longest Streak

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

```
YourFunction 1 2 3 4 5 6 7 8 9   →   8
YourFunction 9 5 4 3 2 6 7 8     →   3
```

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 ⍷ on simple vectors where the left argument is a pair: what to search for and a Boolean mask vector indicating which elements must match.

```
      w ← 5 2 18 5 3 5 4 5 2 18 5
      (5 6 5)(1 0 1) YourFunction w
0 0 0 1 0 1 0 0 0 0 0
      w←'mississippi'
      'issixxi'(1 1 1 1 0 0 1) YourFunction w
0 1 0 0 1 0 0 0 0 0 0
```

Bonus task: Handle higher ranks

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←{⍵≥4:'ACTG'[?3⍴4] ⋄ ⍵⊃s}¨?10⍴8
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 ''                   →  1
YourFunction 'hello world!'       →  1
YourFunction ')(2×3)+/4('         →  0
YourFunction '(()'                →  0
```

Bonus task: Handle [ ] too!

Thank you for playing!

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