

3. Mathematica

The constructs For, While, Do, Table and If are forbidden.

3.1)

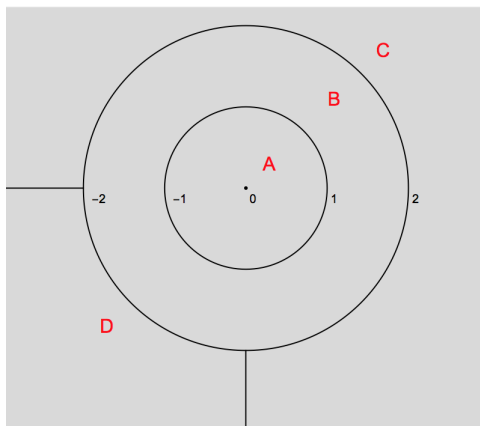
Explain in words the expression `f[x_., n_Integer] /; Length[{x}] > n -> g[x]`

3.2)

What is the output of the following program?

```
Map[
  {#[[1]][#[[2]]], #[[1]][2]#[[2]], #[[2]]#[[1]][#[[1]][1]]}&,
  {#^2 - 1&, 2}, {(# - 1)(# + 1)&, -2}
]
```

3.3)



The function `ABC[x, y]` is defined as $x^2 + y^2$ in the region A (including the borders), $\cos(\sqrt{x^2 + y^2})$ in B (including the external borders), 0 in C, and π in D (including the borders).

Define the function `ABC` in Mathematica.

3.4)

Let `listR` be a list of replacement rules. Write a program to generate the list `listRinv` that contains the same rules as `listR`, but flipped.

Each rule `lhs -> rhs` becomes `rhs -> lhs`.

3.5)

Recall that `Range[3]` returns `{1, 2, 3}`.

What is the output of the following program? Show the intermediate steps.

```
Apply[Plus,
  Map[2^# &, Flatten[Map[Range, {4, 3, 2, 1}]]]
]
```