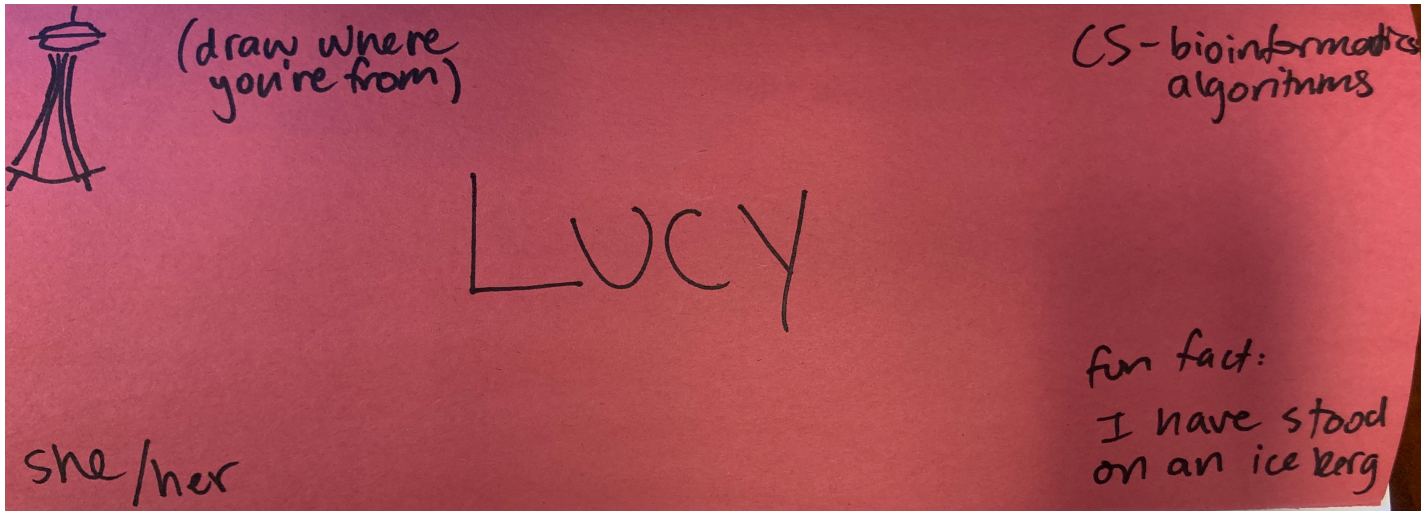
Welcome to CSCI 432/532, Advanced Algorithms Topics!

As you arrive, take a paper and sharpie. Fold paper hotdog style. Sit toward front of classroom.

Write name in middle
Draw where you're from in top left (no words allowed!)
Write your major/concentration/interest in top right
Write your pronouns bottom left if you want to share
Write a fun fact about you on bottom right

Introduce yourself to at least one neighbor



Plan for today:
9-9:10 Intros/get settled
9:10-9:35 Overall course intro activity
9:35-9:50 Housekeeping: syllabus, etc

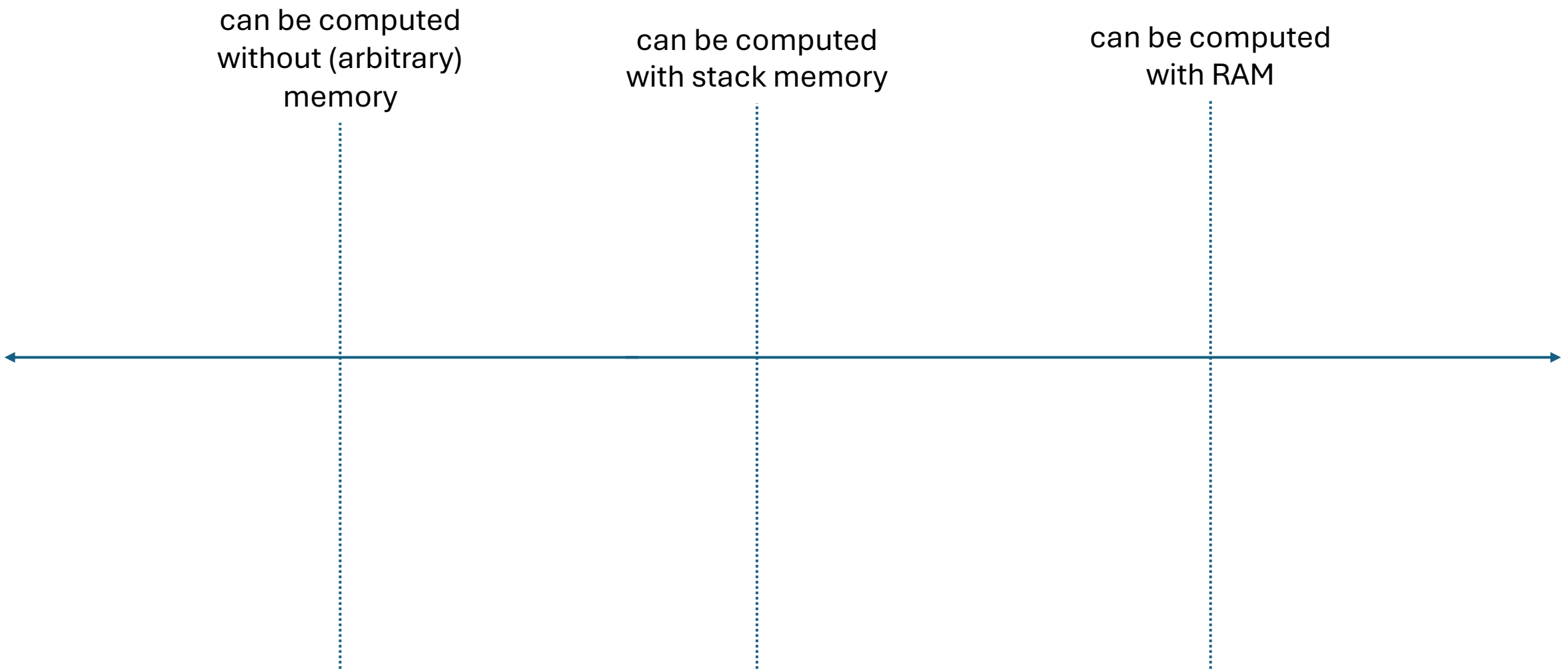
Spectrum of Computability

Spectrum of Computability

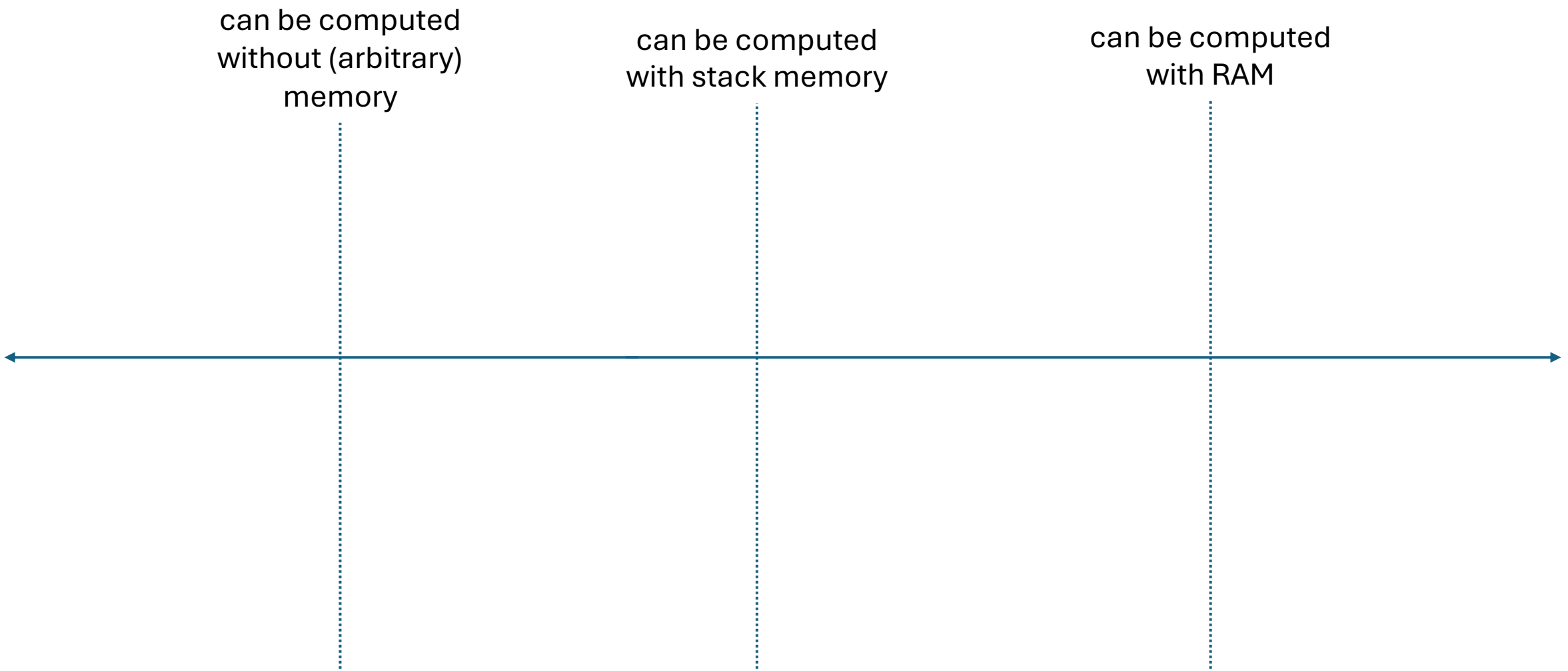
Given a binary string,
does it contain a 1?

Given a graph, does it contain a
clique of size 100?

Spectrum of Computability



Spectrum of Computability

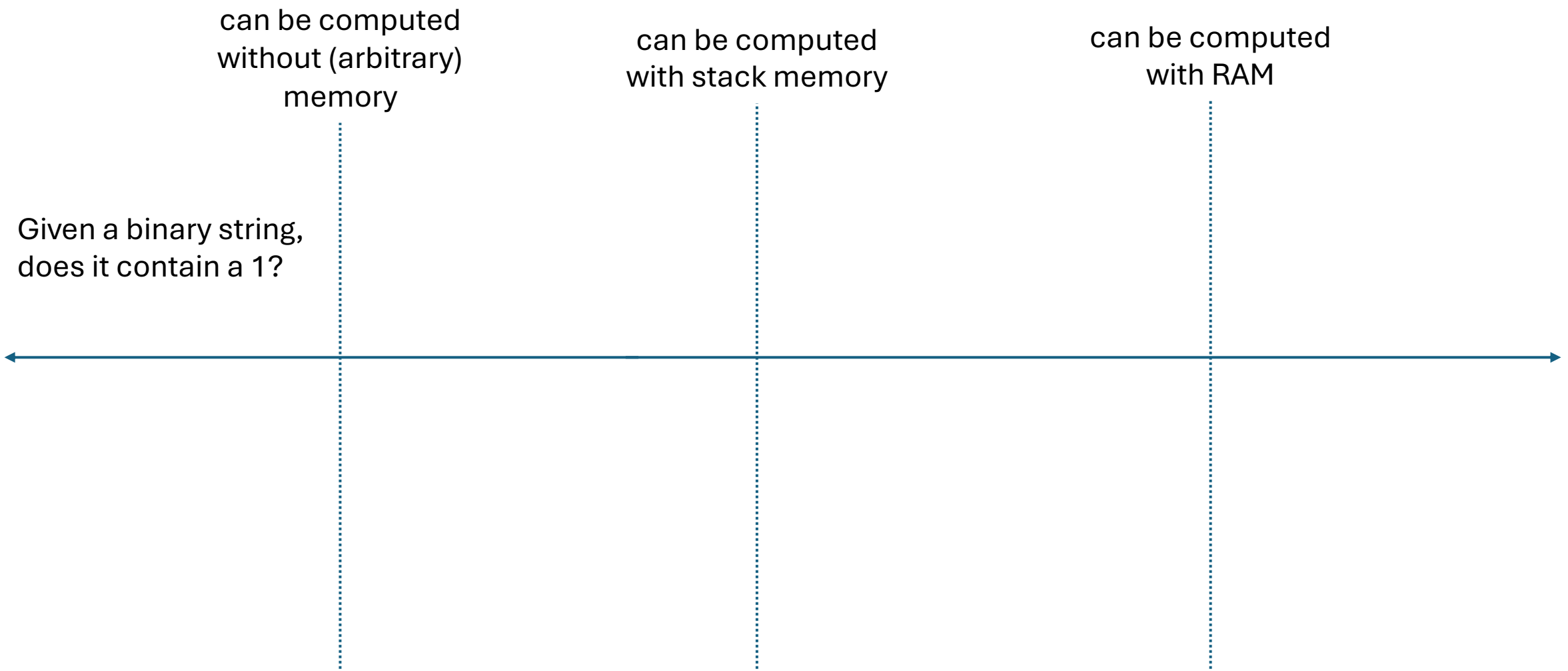


Given a binary string, does it contain a 1?

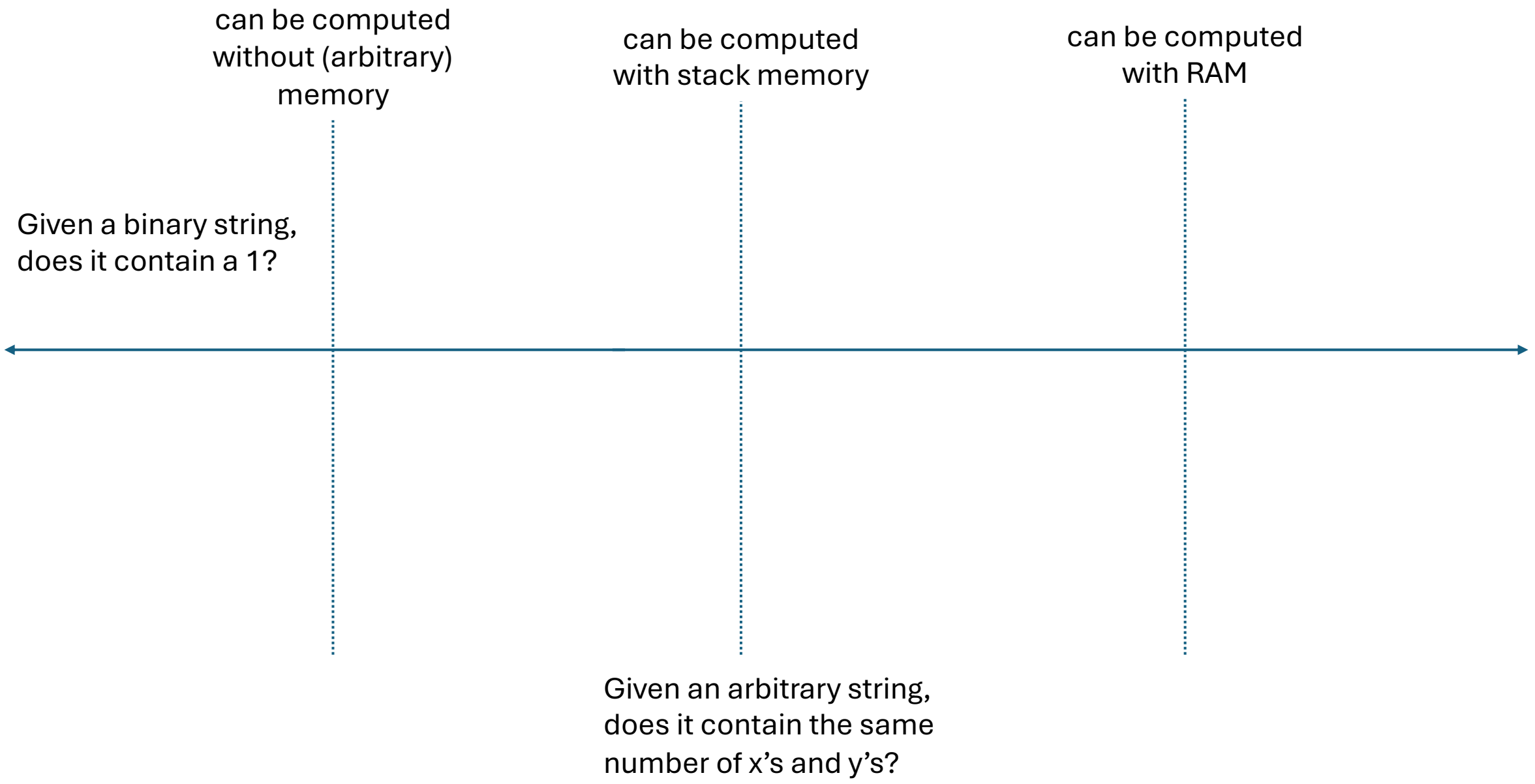
Given a binary string, does it contain a 1?

```
while there is a next symbol in input string:
    if symbol == 1:
        return True
return False
```

Spectrum of Computability



Spectrum of Computability

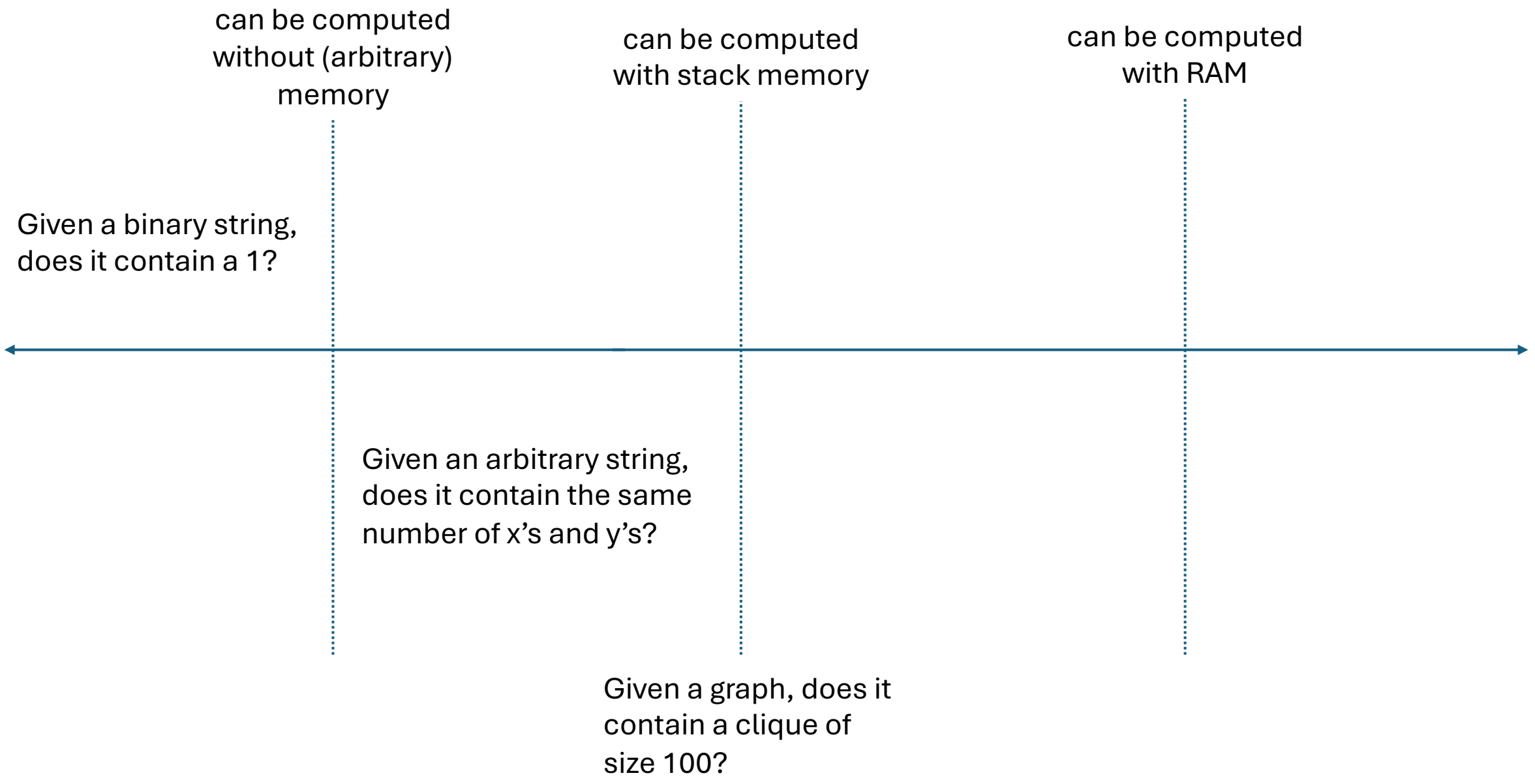


Given an arbitrary string, does it contain the same number of x’s and y’s?

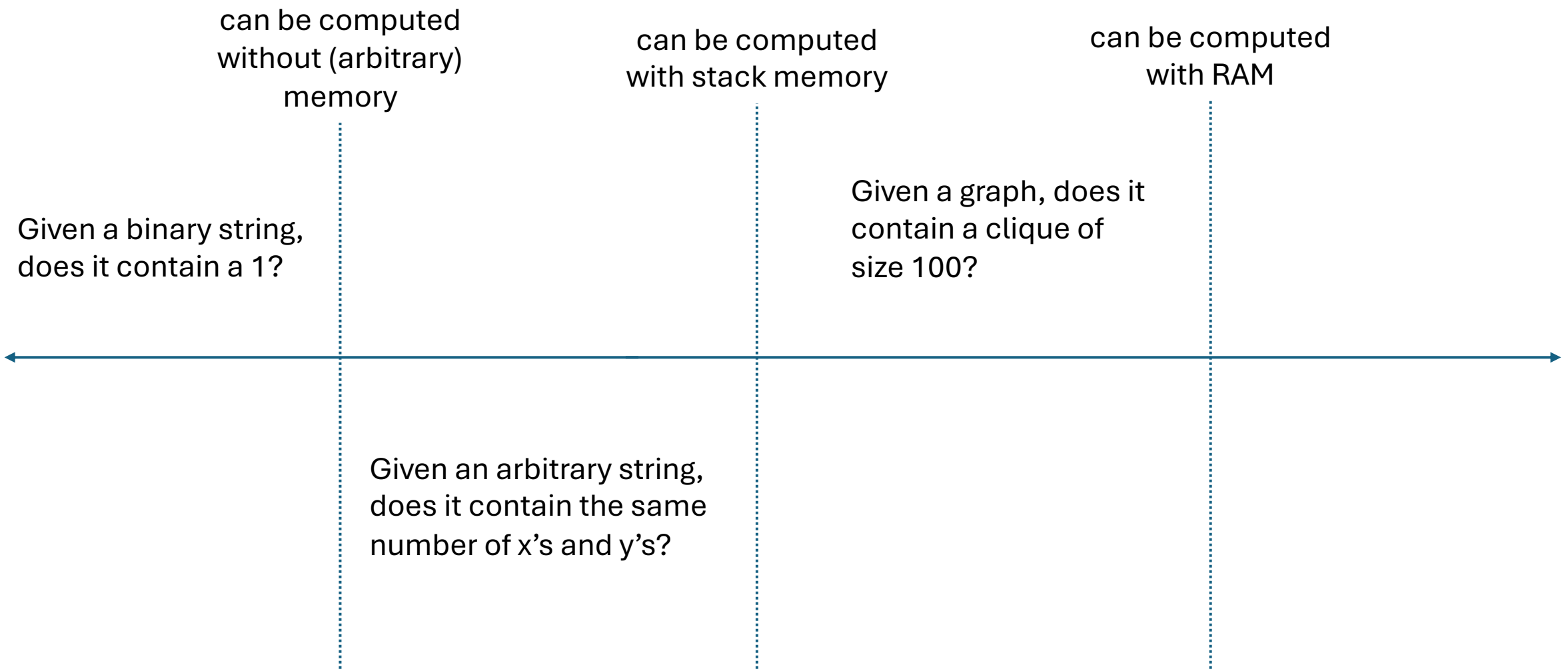
Given an arbitrary string, does it contain the same number of x's and y's?

```
while there is a next symbol in input string:
    if symbol == x:
        push something onto the stack
    if symbol == y:
        pop something from the stack
if stack empty:
    return True
else:
    return False
```

Spectrum of Computability



Spectrum of Computability



Given a Python program, decide whether it terminates on all inputs (does not contain an infinite loop).

Given a polynomial equation $P(x_1, x_2, \ldots, x_n) = 0$, determine whether it has a solution where $x_1, x_2, \ldots, x_n$ are all integers.

Given a set of integers and a target integer T, determine whether there exist a subset of the integers that sums to T.

Given a Java program, are all parentheses and brackets matched and correctly nested?

Given an integer, decide whether it is prime.

Given an integer, find its prime factorization.

Given an integer, decide whether it is divisible by another integer k.

All computational problems