Let's build a static analysis to find the intervals that the integer variables in a program might assume. If 'v' is a program variable, let I(v) == [low, up] be the intervals of values that it might assume.

```
01 k=0
02 while k < 100:
03   i = 0
04   j = k
05   while i < j:
06     i = i + 1
07     j = j - 1
08   k = k + 1
```

I(k) = [0, 0], I(i) = ?, I(j) = ?

You might refine your analysis, considering that a variable can be bound to different intervals at different program points. For instance, before the loop, variable k can only be zero, so the interval of its potential values is [0, 0].

I(k) = [?, ?], I(i) = [?, ?], I(j) = [?, ?]

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Figure 1: Python program

1. Can you compute, manually, the intervals covered by each variable at each program point?

2. What is the lattice of your analysis?

3. Can you think about transfer functions for your analysis?

4. Does your analysis terminate? Can you demonstrate that it does?

5. Before you answer (4), you might want to take a look into Figure 2. Would you analysis terminate for this program?

```
01 k=0
02 while True:
03   k += 1
```

Figure 2: Python program that does not terminate.