Solución al problema de inanición del túnel Kiyotaki:

Monitor

```
north_cars = 0
south_cars = 0
north_waiting = 0
south_waiting = 0
direction = NONE          # dirección del túnel.
north_entry = Condition
south_entry = Condition
north_queue = Condition
south_queue = Condition
```

Constantes:

```
SOUTH = 1
NORTH = 0
NONE = -1
```

Invariante:

$$\begin{cases} north\_waiting > 0 \rightarrow t\_direction = NORTH \vee t\_direction = NONE \\ north\_cars > 0 \rightarrow south\_cars = 0 \wedge (t\_direction = SOUTH \vee t\_direction = NONE) \end{cases}$$

$$\begin{cases} south\_waiting > 0 \rightarrow direction = SOUTH \vee t\_direction = NONE \\ south\_cars > 0 \rightarrow north\_cars = 0 \wedge (t\_direction = NORTH \vee t\_direction = NONE) \end{cases}$$

```
def wants_enter(direction):
    if direction == SOUTH:
        north_queue.wait(t_direction == NORTH ∨ t_direction == NONE)
        north_waiting += 1
        north_entry.wait(south_cars == 0 ∧ (t_direction == SOUTH ∨ t_direction == NONE))
        north_cars += 1
        north_waiting -= 1
        t_direction = SOUTH
        south_queue.notify_all()
    else:
        south_queue.wait(t_direction == SOUTH ∨ t_direction == NONE)
        south_waiting += 1
        south_entry.wait(north_cars == 0 ∧ (t_direction == NORTH ∨ t_direction == NONE))
        south_cars += 1
        south_waiting -= 1
        t_direction = NORTH
        north_queue.notify_all()
```

```
def leaves_tunnel(direction):
    if direction==SOUTH:
        north_car -= 1
        if north_cars==0:
            if north_waiting==0:
                t_direction = NORTH
                north_queue.notify_all()
            south_entry.notify_all()
        if south_waiting==0
            t_direction = NONE
            north_entry.notify_all()
            south_queue.notify_all()
    else:
        south_cars -= 1
        if south_cars==0:
            if south_waiting>0:
                t_direction = SOUTH
                south_queue.notify_all()
            north_entry.notify_all()
        if north_waiting==0
            t_direction=NONE
            south_entry.notify_all()
            north_queue.notify_all()
```

No hay más coches esperando se cambia la dirección

No hay coches en el otro lado esperando, se pone la dirección general (NONE) y se avisa a:
1º: coches en el norte (de nuevo)
2º: coches sin esperar en el otro lado