Tarea respondiendo preguntas 2

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Pregunta 1

La numeracion de las reglas esta dada por la represntacion binaria resultante de combinar los vecindarios
(e.g.) Tomemos la siguiente regla

111 -> 0
110 -> 0
101 -> 0
100 -> 1
011 -> 1
010 -> 1
001 -> 1
000 -> 0

Al combinar los resultados se obtiene la secuencia 00011110 por lo tanto esta regla es la 30.

Pregunta 2

La regla 30 es importante debido a que genera patrones aparentemente aleatoreos, esto pese a la simplicidad
y naturaleza determinista de la regla.

Pregunta 3

La regla 8 es terrible fome, donde cualquier combinacion de tuplas de valores resulta en un 0 exceptuando la

100.

```
;; set the state of the patch below by applying rule 30
to do-rule   ;; patch procedure
  ;; assign values to patch variables based on current state of the row
  set left-pcolor [pcolor] of patch-at -1 0
  set center-pcolor pcolor
  set right-pcolor [pcolor] of patch-at 1 0
  if rule = 30 [
    ifelse ((left-pcolor = yellow and center-pcolor = black and right-pcolor = black) or  ;; evaluate rule 30
      (left-pcolor = black and center-pcolor = yellow and right-pcolor = yellow) or
      (left-pcolor = black and center-pcolor = yellow and right-pcolor = black) or
      (left-pcolor = black and center-pcolor = black and right-pcolor = yellow))
    [ ask patch-at 0 -1 [ set pcolor yellow ] ]
    [ ask patch-at 0 -1 [ set pcolor black ] ]
  ]
  if rule = 8 [
    ifelse (left-pcolor = black and center-pcolor = yellow and right-pcolor = yellow)
    [ ask patch-at 0 -1 [ set pcolor yellow ] ]
    [ ask patch-at 0 -1 [ set pcolor black ] ]
  ]
end
```
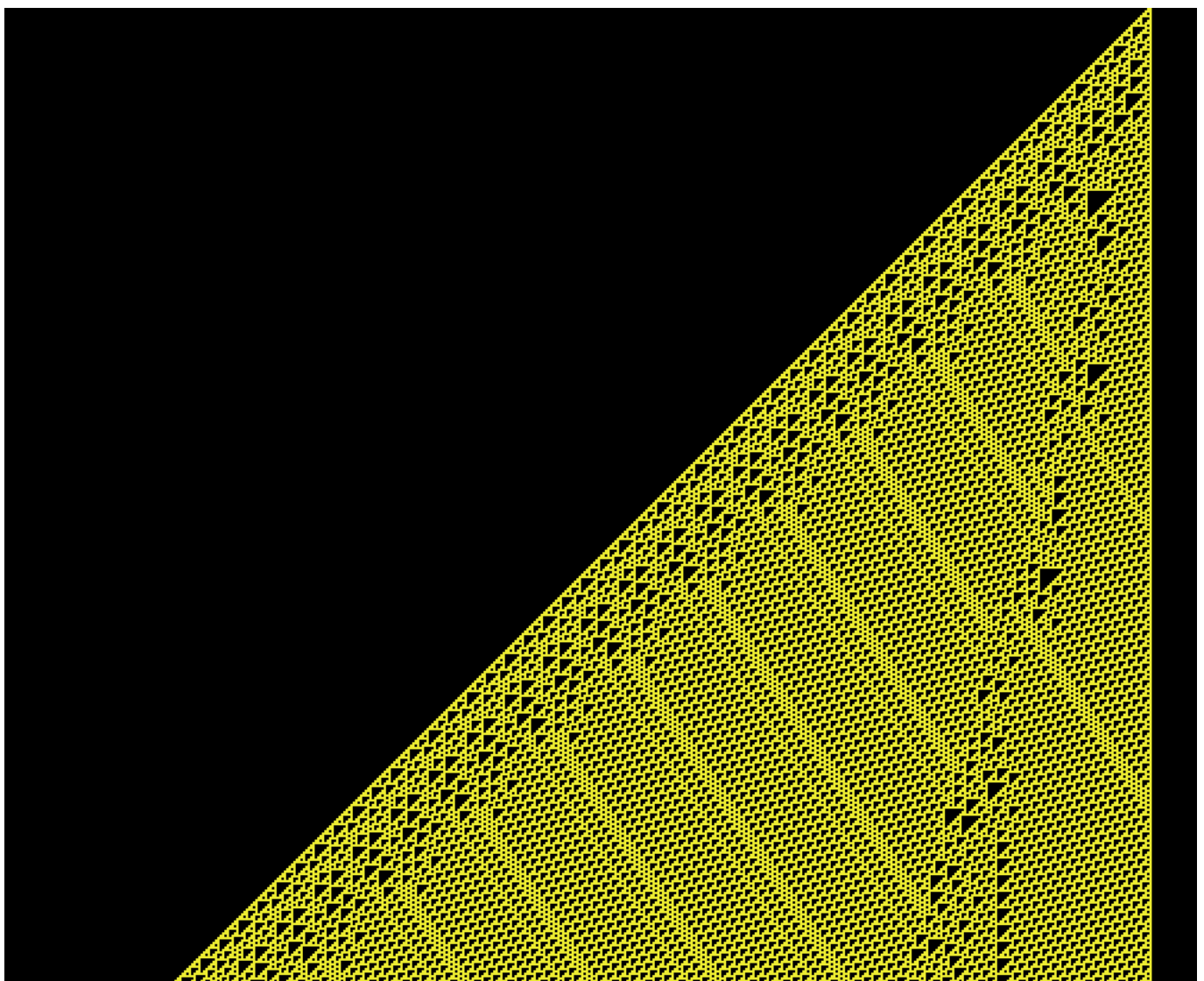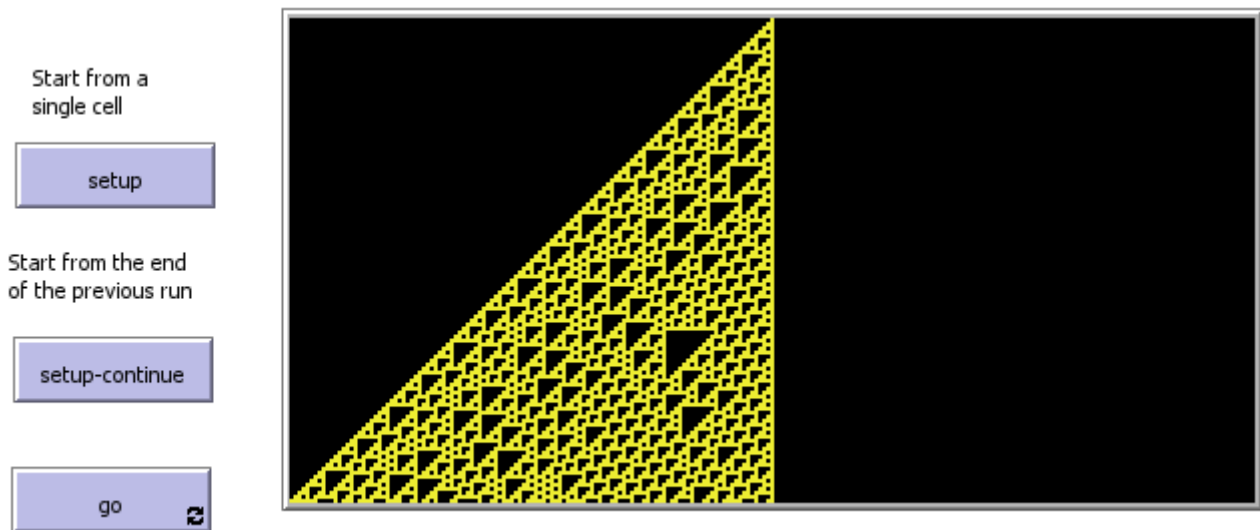
Se puede apreciar que la secuencia no continua debido a la poca cantidad de disponibilidad de generacion de '1s'.
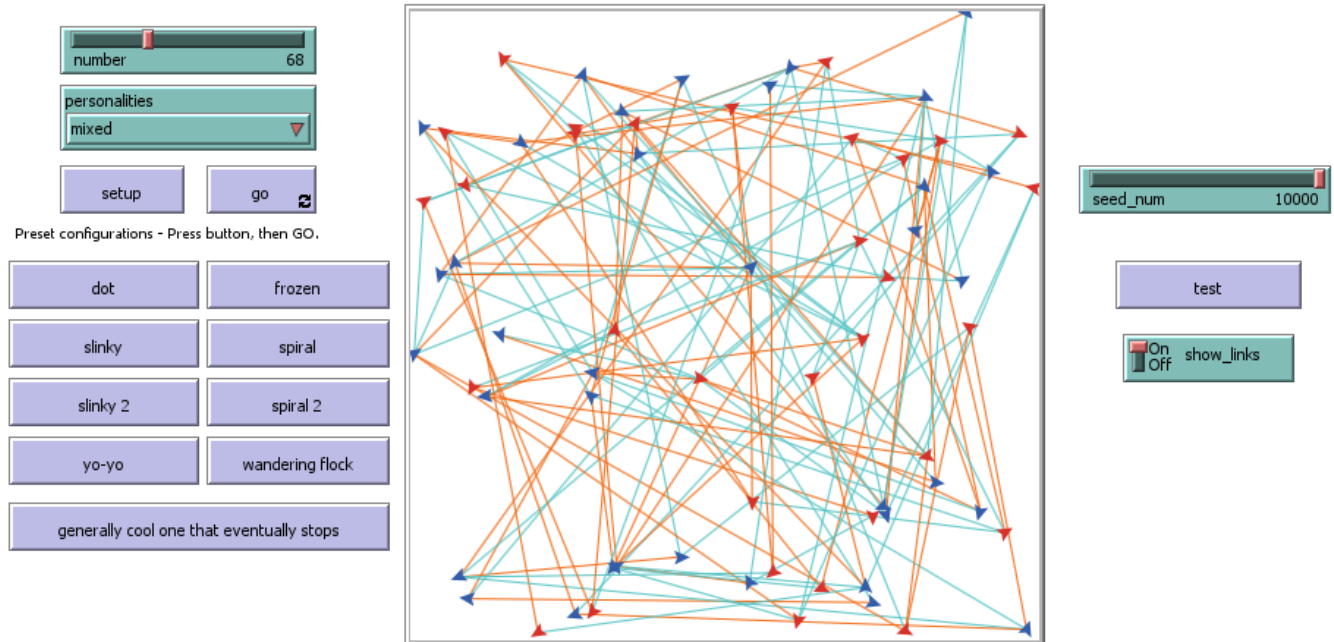
Pregunta 4

Todo sistema no trivial puede ser traducido a un programa de computador. Es decir que los sistemas sencillos pueden realizxar calculos tan complejos como los sistemas mas avanzados.

Pregunta 5

Se pueden observar patrones simples que evolucionan a un patron mas complejo de forma regular. Segun wikipedia es turing-completo lo cual implica que puede hacer cualquier cantidad de calculos.
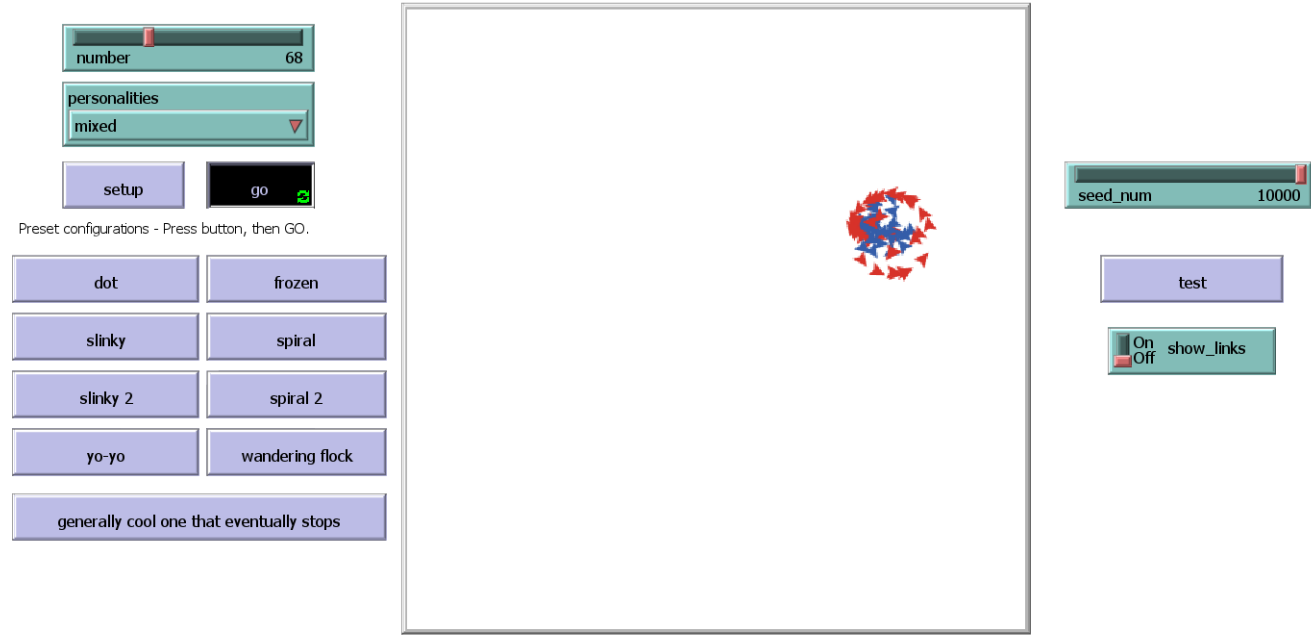
Pregunta 6

```
to setup
  clear-all
  ask patches [ set pcolor white ]  ;; create a blank background
  create-turtles number [
    setxy random-xcor random-ycor

    ;; set the turtle personalities based on chooser
    if (personalities = "brave")      [ set color blue ]
    if (personalities = "cowardly")  [ set color red ]
    if (personalities = "mixed")     [ set color one-of [ red blue ] ]

    ;; choose friend and enemy targets
    set friend one-of other turtles
    set enemy one-of other turtles
  ]
  if show_links [
  ask turtles [
    create-link-with friend
    ask link-with friend [set color cyan]
    create-link-with enemy
    ask link-with enemy [set color orange]
  ]
  ]
  reset-ticks
end
```
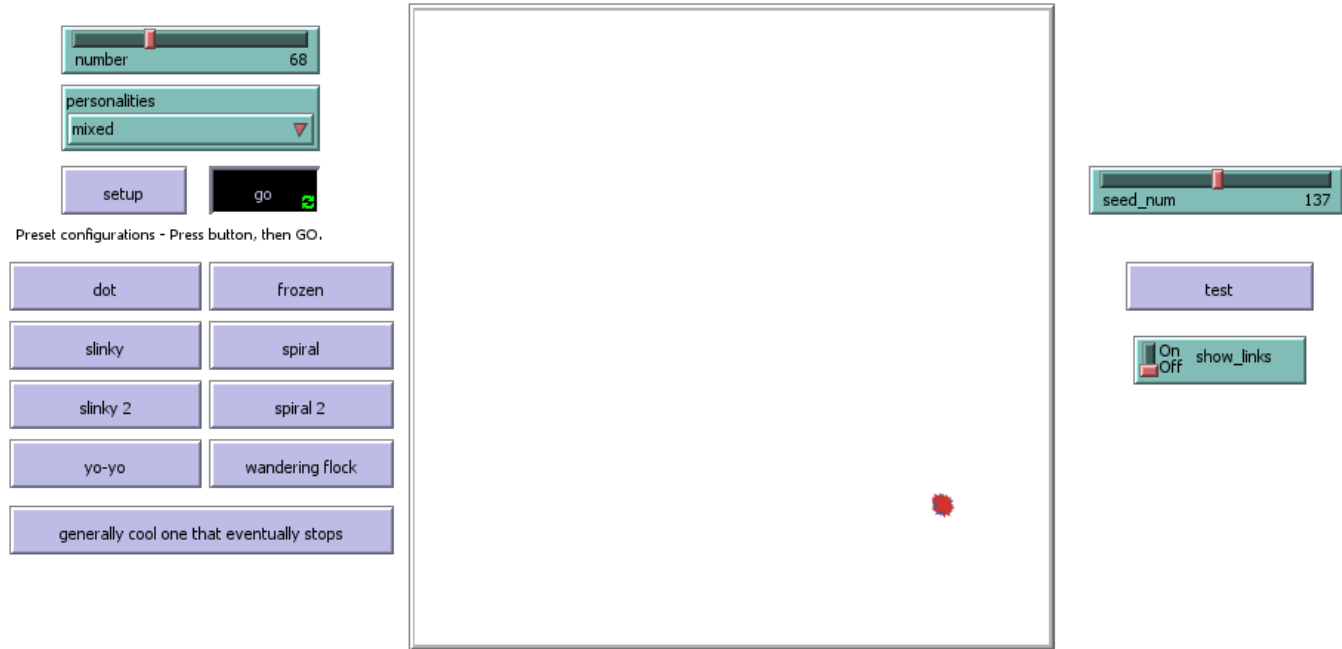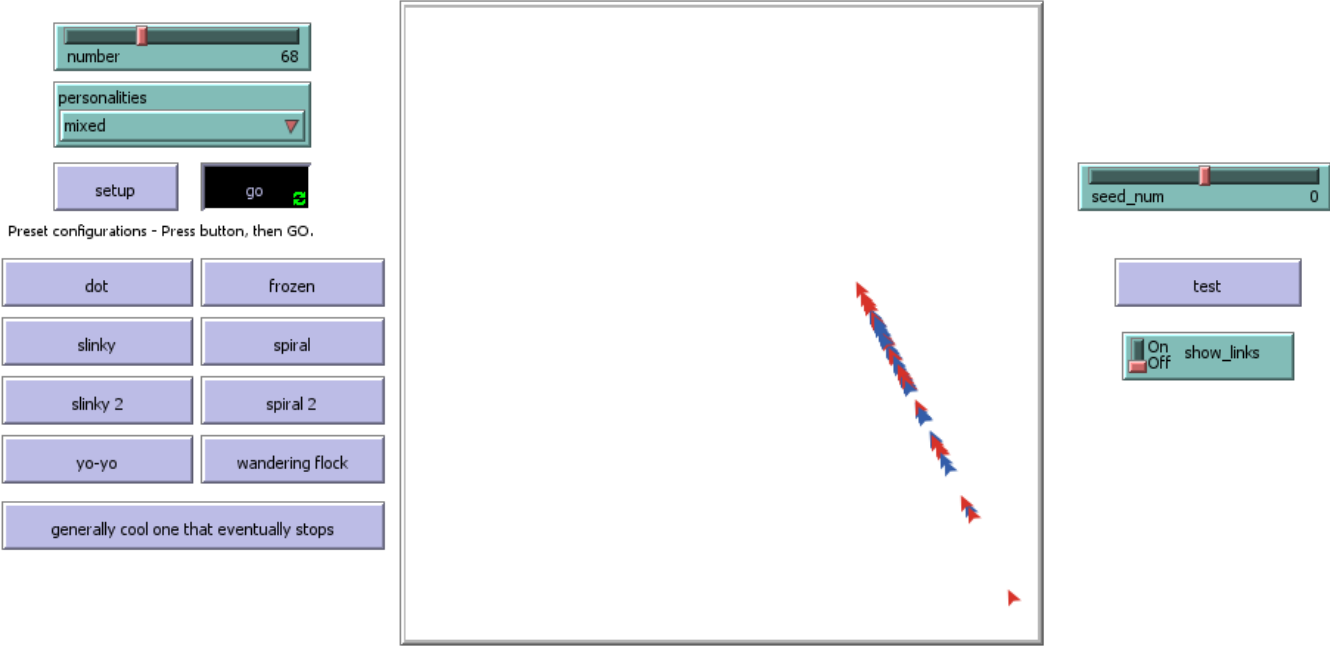
Pregunta 7

La semilla 10000 genera un espiral de agentes que eventualmente se convierte en un punto.

La semilla 137 genra un punto de forma inmediata.

La semilla 567 genera un patron estatico donde los agentes no pueden moverse.

La semila 0 genera un patron en constante movimiento similar a una serpiente.

```
turtles-own [ friend enemy ]

to setup
  clear-all
  ask patches [ set pcolor white ]  ;; create a blank background
  create-turtles number [
    setxy random-xcor random-ycor

    ;; set the turtle personalities based on chooser
    if (personalities = "brave")     [ set color blue ]
    if (personalities = "cowardly")  [ set color red ]
    if (personalities = "mixed")     [ set color one-of [ red blue ] ]

    ;; choose friend and enemy targets
    set friend one-of other turtles
    set enemy one-of other turtles
  ]
  if show_links [
  ask turtles [
      create-link-with friend
      ask link-with friend [set color cyan]
      create-link-with enemy
      ask link-with enemy [set color orange]
    ]
  ]
  reset-ticks
end

to go
  ask turtles [
    if (color = blue)  [ act-bravely ]
    if (color = red)   [ act-cowardly ]
  ]
  tick
end

to act-bravely
  ;; move toward the midpoint of your friend and enemy
  facexy ([xcor] of friend + [xcor] of enemy) / 2
         ([ycor] of friend + [ycor] of enemy) / 2
  fd 0.1
end

to act-cowardly
  ;; put your friend between you and your enemy
  facexy [xcor] of friend + ([xcor] of friend - [xcor] of enemy) / 2
         [ycor] of friend + ([ycor] of friend - [ycor] of enemy) / 2
  fd 0.1
end

to preset [ seed ]
  ;; sets up the model for use with a particular random seed and constant
  ;; model parameters, so that a particular pattern can be re-created.
  set personalities "mixed"
  set number 68
  random-seed seed
  setup
end
```