Bunny Simulation

In this assignment, you will build a simulation of a bunny living in a fenced in meadow in the countryside. You must write a software application that answers the following question: What is the approximate minimum plant regeneration rate (plants regenerated per unit time) required to sustain the bunny for 10000 units of time?

Rules of the Simulation (constraints)

The rules that guide the simulation are as follows:

* A bunny occupies a meadow that is 30 units wide and 30 units long.
* The bunny has a limited amount of energy. 1000 units to start.
* The bunny can only move one spatial unit per unit time. Each movement may be in any direction. The bunny cannot leave the meadow.
* The bunny must start the simulation in the middle of the meadow.
* Each time the bunny moves, it spends 1 unit of energy.
* The meadow is bathed by sunlight, and the soil is fertile and rich. Plants grow in the meadow. These plants can be eaten by the bunny. Each plant boosts the energy of the bunny by ten units. When the plant is eaten by the bunny, it should no longer be present in the meadow.
* Plants grow at random in the meadow.
* No two plants may occupy the same space in the meadow.

Primary goal (simulate & solve)

* To determine the approximate minimum plant regeneration rate required to sustain the bunny for 10000 units of time.
* Your solution must be printed out to the console using the form: "The minimum plant regeneration rate required to sustain the bunny for 10000 units of time is #### regenerations/unit time".
* The final plant regeneration rate you print out must produce 100% survival if the simulation is run 5 consecutive times.
* 80% of assignment grade

Secondary goals (visualization)

The secondary goals involve generating visualizations of the data generated by your simulations. Choose one of the following options:

* Create a data visualization that helps make the results of your simulation more clear. For example, you could create a series of line graphs that plot bunny health versus time for different plant regeneration rates.
* Create a visualization that shows one complete trial of your simulation. This should include a visual representation of the meadow, the bunny, the plants and the data associated with the bunny's health and the passage of time (a simple visual counter would suffice). For an idea of what the simulation might look like see the following video: [Link (Links to an external site.)](https://www.youtube.com/watch?v=7zctX-5T3_Q&feature=youtu.be)

You may use external JS libraries for this part of the assignment (d3.js, graph.js, etc).

* 20% of assignment grade

**My notes from what he said in class:**

* Modified existing assignment used in the past -> Bunny Assignment
* My job: figure out plant regeneration rate in a field for our little bunny in the field not to die in 10,000 units of time
* Needs to be printed out to console in # of regenerations per time
* Must produce 100% survival if the simulation is run 5 consecutive times
* There is a value around which your response should fall
* Rules of the Simulation:
  + Dimensions are provided (30x30 units)
    - Starts with no plants
    - Full of plants
    - Bunny WILL eat plant if found
    - Once eaten, its done
    - Plant grows randomly in meadow (no density grouping)
  + Bunny health provided
    - Unlimited amount of energy (1,000 units)
    - Uses 1 unit per movement
    - Never stands still
    - Plant found/eaten by bunny will boost energy by 10 unit
  + Bunny's starting point
  + Limitations how bunny moves through field
    - Only moves 1 spatial unit at a time, but can be any direction (360 degrees -> facilitate this by up, down, left, right and diagonal as opposed to unlimited, non-finite movements)
    - Can not leave meadow
* Solving the simulation is 80%, the visualization component is 20% with options
  + Options:
    - Graphical evidence supports simulation: Create a DV that makes visualization more clear aka line graphs that show plant health and how it relates to bunny survival
    - Create visualization that shows 1 complete trial of simulation: plants, meadow, bunny and passage of time