1. Add one cell of type NORMAL and subType END
2. Scale view to number of iterations so that all can be seen at the end.
3. Iterate over all cells and draw them
4. Update the simulation one step at a time as directed from the GUI (maximum of "iter" currently equal to 30). Update the metanephric cells at each step (attractive cells are stationary). Every "SKIP\_CELL\_GROWTH\_STEPS", update the normal cells.
   1. When the iteration number START\_METANEPHRIC\_CELLS (set to "1") is reached, create attractive cells and metanephric cells. Note that iteration "0"
      1. Metanephric cells are initially positioned as follows
         1. NUM\_METANEPHRIC\_CELLS are created (set to "50"
         2. They are randomly positioned as follows: within a half circle defined at the origin whose radius is 70% the maximum possible cell growth in one direction.
         3. Metanephric cells are colored blue initially. When they cross over a periodic boundary, they are colored black and when they become attached to a normal cell, they are colored gray.
      2. Attractive cells are initially positioned as follows:
         1. NUM\_ATTRACTIVE\_CELLS are created (set to "10")
         2. They are placed in an arc about the origin at a radius that is 90% of the maximum amount of possible cell growth in one direction.
   2. Every SKIP\_CELL\_GROWTH\_STEPS up until the maximum steps, create and position new normal cells based on their sub-types.
      1. Start with an END (sub type) cell (cyan).
      2. After the second normal cell appears create 1 cell on either side of sub type MAIN\_R (red) and MAIN\_L (red) at the angle 120 apart from each other
      3. Only one cell on each main side branch is labeled MAIN\_R or MAIN\_L. When a new main branch cell is created, it is of type MAIN\_R or MAIN\_L depending on which side of the tree it is on, and the previous MAIN\_R or MAIN\_L becomes type MAIN (green)
      4. Cells that branch off the main branches are initially of type END, and when new cells grow from them, they are changed to type INTERMEDIATE (yellow)
      5. At the last iteration that produces normal cells (as opposed to metanephric), 2 LAST cells are grown 180 deg from each other from each END cell.
5. At each iteration:
   1. metanephric cells are moved every iteration. If there are no attractive cells, (normal cells of subtype LAST), a random number scaledfrom 0 to 360 degrees is calculated as well as a randomly generated "r" value between 0 and 1. This provides the polar coordinates for the translation of the metanephric cell. all metanephric cells are subject to periodic boundary conditions based on an orthogonal cell whose dimensions are the boundaries of the display
      1. normal cells that are of subtype LAST will attract metanephric cells as follows:
         1. The distance from the metanephric cell to the nearest normal cell of subtype LAST is calculated.
         2. A vector to the nearest normal cell is calculated.
         3. A random angle is calculated (30 deg and 60 deg) with an alternating sign and vector in (B) is rotated by this amount.
         4. A step of 0.1 is taken along this newly calculated direction.
      2. If any metanephric cell is within DOCKING\_DISTANCE (currently 0.1) from a cell of type LAST or within DOCKING\_DISTANCE of another docked metanephric cell that was the last one docked to that particular normal cell, it will be docked to that cell and not move.
      3. Each time a metanephric cell docks a new one is created with random coordinates
   2. Every SKIP\_CELL\_GROWTH\_STEPS grow more normal cells
      1. for cells grown from main branch cells, grow up to maxBranch cells (determined by a random number). maxBranch is currently set to 2.
      2. for cells grown off cells of subtype END, grow 2 cells as long as the total number of cells grown off this particular cell is < maxIntermediateBranch (currently 2)
      3. for cells grown off cells of subtype INTERMEDIATE, grow at most maxBranch cells as long as the total number of cells grown off this particular cell is < maxIntermediateBranch (currently 2)
      4. new normal cells are positioned as follows:
         1. If there are attractive cells present, a vector that points to the nearest attractive cell is calculated.
         2. If the new cell is grown from a cell on the main branches, the vector is rotated between between 0 and 30 degrees based on a random number
         3. If the new cell is grown from a cell not on the main branches, the vector is rotated between between 30 and 60 degrees based on a random number