MATH 2121　　　Mathematical Modeling and Simulation　　　Spring 2024
Problem Set 4
(Out Tue 02/20/2024, Due Tue 02/27/2024)

Submissions are to be done by emailing to the course instructor: all requested Matlab files, plus a single file (PDF preferred), called `yourfamilyname_pset4.pdf` that contains all requested explanations.

Problem 4

(a) Modify the Matlab file `temple_abm_population_migrate_mate_and_age.m` from the course website `http://math.temple.edu/~seibold/teaching/2024_2121/` as follows:
(i) increase the speed of the agents to 0.02;
(ii) place initially 500 agents uniformly in the left half domain, $(x, y) \in [0, 5] \times [0, 10]$;
(iii) change the code so that offspring-producing cells are ones that contain 7, 8, 9, or 10 agents;
(iv) change the code so that (in each step) an offspring-producing cell produces a new agent with probability 1/4.
Run your code multiple times and explain your observations. Submit your program under the filename `yourfamilyname_problem4a.m`

(b) Now modify your program by changing the probability of a cell producing a new agent to 1/5. Describe and explain what the model now generates, and why.

(c) Leave the probability of a cell producing a new agent at 1/5, but now let a cell be offspring-producing if it contains 7, 8, 9, 10, 11, 12, 13, 14, or 15 agents. Describe and explain what the model generates, and why.