This repository contains all code to create the figures in the manuscript "A Hopf-Lax Type Formula for Multi-Agent Path Planning with Pattern Coordination" by Christian Parkinson and Adan Baca.

Each directory Figure$X$, for $X = 1, 2, 3$, is self-contained and contains the code which produced the corresponding figure in the manuscript. To run the code, simply download the contents of one of the directores, save them in the same location, and use MATLAB to run the file `driver.m`. The code is commented so as to be human readable (hopefully).

Each directory has the following contents:

- `driver.m` - a script file where the simulation is set up and hyperparameters are chosen. The plotting also occurs in this file.

- `solveHJB.m` - a function which takes in all the information from the driver and runs algorithm 1 from the manuscript to resolve the solution of the Hamilton-Jacobi-Bellman equation at the specified point. It returns not only the value of the solution, but the optimal trajectories for the vehicles, which are then plotted in the driver file.

In addition, some directories have helper functions and/or data files as follows:

- `Figure2/{generateDisjointCircles.m, car.mat, obs.mat}` - the function generate disjoint circles can be used to create random obstacles as specified in the documentation within the function. The data files `car.mat` and `obs.mat` contain (respectively), coordinates used to plot a simple car, and the specific obstacles used in figure 2 from the manuscript.

- `Figure3/drawArrow.m` - a helper function for drawing the arrows in Figure 3 of the manuscript

Finally, each directory contains the `.png` images actually used in the manuscript, as well as a `.mp4` video which animates the same simulation.