10.1

Probability of winning game 1: p

Probability of winning game 2:

We should play game 1 if P(Game1) > P(Game2):

Because p – 1 < 0, then we get 2p – 1 < 0, so p < 0.5

We should play game 1 if p < 0.5, otherwise we should play game 2.

10.2

None of the three ants will collide if all three are moving in clockwise direction, or all three are moving in a counter-clockwise direction. Otherwise, there will definitely be a collision.

How many ways are there for the three ants to move? Each ant can move in 2 directions, so there are ways the ant can move. There are only two ways which will avoid a collision, therefore the probability of collision is

To generalize this to an n-vertex polygon: there are still only 2 ways in which the ants can move to avoid a collision, but there are ways they can move total. Therefore, in general, probability of collision is .