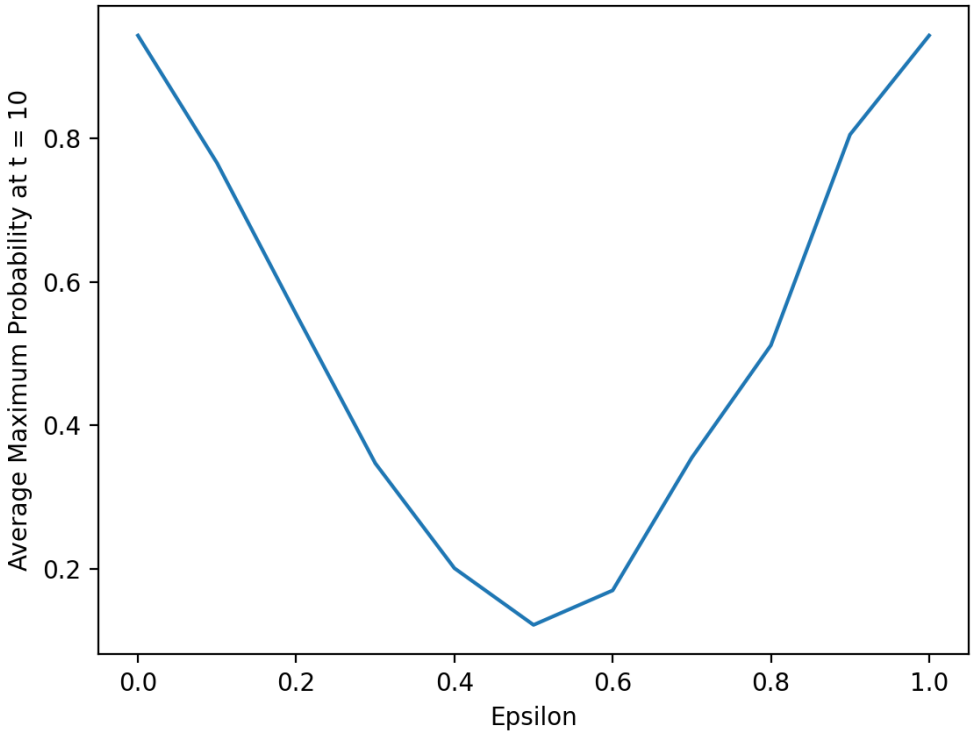
Assignment 2 Question 2 (Programming)

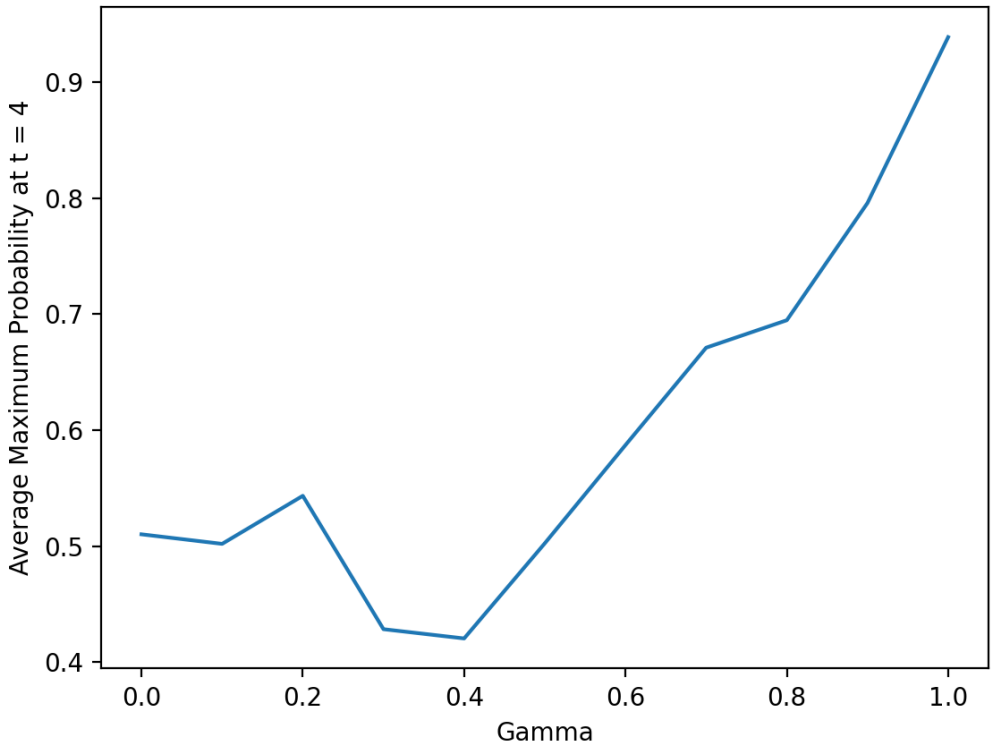
2a)



Based on the plot above, the robot is most confident in its location at t = 10 when the sensor is either noiseless (i.e. epsilon = 0) or absolutely noisy (i.e. epsilon = 1), while the robot is least confident when the sensor has a 50% chance of flipping each bit (i.e. epsilon = 0.5).

When epsilon is either 0 or 1, the robot observes sensor readings that are either completely correct (none flipped) or wrong (all flipped) – either way, the observational probability gets maximized which translates to minimum uncertainty in its potential location, hence the robot has maximum confidence in its location. On the other hand, when epsilon = 0.5, the robot observes sensor readings in which each bit has a 50% chance of having been flipped – this minimizes the observational probability which translates to maximum uncertainty in the robot's location (i.e. this is the same as saying that the robot's attempt to deduce its location in the face of that 50% chance is just as good as taking a random guess at this point), hence the robot has minimum confidence in its location.

b)



Based on the plot above, the robot is most confident at t = 4 when gamma = 1 (i.e. noiseless actions), while the robot becomes less confident as gamma decreases (i.e. noisier actions), with smaller gamma values between 0 and 0.5 resulting in the robot being only 40-50% confident.

When gamma = 1, the robot moves in the intended direction all the time which translates to minimum uncertainty regarding its potential location, hence the robot has maximum confidence in its location. However, as gamma decreases from 1, the robot moves in the intended direction only occasionally which translates to more uncertainty regarding its potential location, hence the robot has less confidence in its location.