This homework will consist mostly of problems from the book. Some will require writing a short program or using Matlab or Mathematica, and then making graphs from your data.

Please write up each problem clearly and completely. Use whole English sentences.

You may work with a partner.

1. AIMA 20.1

2. AIMA 20.2

3. (Based on AIMA 20.3) Assume Ann’s utility for a cherry candy is $C_A$ and her utility for a lime is $L_A$. She doesn’t care whether they’ve been unwrapped or not. Bob is indifferent between kinds of candy, and has utility $U_B$ for a piece of either kind.

Let $b = (b_1, b_2, b_3, b_4, b_5)$ be Ann’s beliefs in the different possible make-ups of her bag of candy.

(a) Give an expression for Ann’s belief, $b_C$, that she’ll pull a cherry candy out of the bag, given $(b_1, b_2, b_3, b_4, b_5)$.

(b) Give expressions for Ann’s updated belief after pulling out a cherry candy, $d_C(b)$, and her updated belief after pulling out a lime candy, $d_L(b)$.

(c) If Ann is not allowed to unwrap any candies, give an expression for the least value of $U_B$ that will cause her to sell her bag of candy, as a function of $L_A$, $C_A$, and $b_C$.

(d) We can develop a value function for Ann’s current state, described by her beliefs $b$ and the number $n$ of candies remaining in her bag. Give an expression for $V_1(b)$, and then for $V_n(b)$ in terms of $V_{n-1}(b)$.

(e) If there are 4 candies, Ann has the prior beliefs specified in the book, and $L_A = 1$, $C_A = 10$, and $U_B = 3$, what is Ann’s optimal strategy?

(f) Say at least one more interesting thing about her optimal strategy in general. Back it up with an experiment or a proof.

4. AIMA 20.4

5. AIMA 20.7

6. AIMA 20.9

7. AIMA 20.10 b, c, and d.

I’ll add one or two more problems after the next lecture.