

AM 121: Homework # 6 (Due date Nov 21, Thursday)

The book we refer to is Hillier & Lieberman, *Introduction to Operations Research* (7th Edition).

1. Problem 11.3-2.
2. A sales representative lives in Bloomington and must be in Indianapolis next Thursday. On each day of the days Monday, Tuesday, and Wednesday, he can sell his wares in Indianapolis, Bloomington, or Chicago. From past experience, he believes that he can earn \$12 from spending a day in Indianapolis, \$16 from spending a day in Bloomington, and \$17 from spending a day in Chicago. Where should he spend the first three days of the week to maximize his sales income less travel costs? Travel costs are shown below

	Indianapolis	Bloomington	Chicago
Indianapolis	—	5	2
Bloomington	5	—	7
Chicago	2	7	—

3. During any year, I can consume any amount that does not exceed my current wealth. If I consume c dollars a year, I earn c^a units of happiness (utility). Assume $0 < a < 1$. By the beginning of the next year, the previous year's ending wealth grows by a factor k .
 - (a) Suppose I currently have w_0 dollars, and want to maximize the total utility earned during the next N years. Formulate the problem as a dynamic programming problem. Clearly indicate the stage, the state, the evolution of system, the cost criteria.
 - (b) Let $f_n(w)$ be the maximum utility earned during years $n, n + 1, \dots, N$, given that I have w dollars at the beginning of year n ; and let $c_n^*(w)$ be the optimal amount that should be consumed during year n to attain $f_n(w)$. By working backwards, show that for appropriately chosen constants a_n and b_n ,

$$f_n(w) = b_n w^a, \quad c_n^*(w) = a_n w.$$

Interpret these results.