

ISyE 3104 - Homework 6
Due: October 13, 2005
(15 points)

The producer of cases for a newly designed myPod audio player uses a single machine that can produce only one color of case at a time and it requires some time to reconfigure the machine before producing another color of cases. The company has contracted to supply 8 different colors to a retailer, which orders different quantities for different colors. However, the demand is fixed annually for each color case. The producer has different production rates for each color of case since the chemical used in coloring shows different characteristics. The related information is tabulated below:

Color	Annual Demand	Production rate (units/day)	Setup time (hours)	Variable cost (cents)
Lemon	25,900	4,500	6	0.3
Orange	42,000	5,500	4	0.2
Lime	14,400	3,300	8	0.8
Blueberry	46,000	3,200	4	0.2
Strawberry	12,500	1,800	3	1
Black	75,000	3,900	6	0.5
White	30,000	2,900	1	0.4
Red	18,900	1,200	3	0.7

The producer works 250 days in a year and they use 21% annual interest rate for holding costs. Setup costs are solely based on the cost of labor required to configure the machine, which is fixed at \$20 per hour. Suppose that the producer decides to use a rotation cycle policy for the production of cases.

- a. (8 points) What is the optimal rotation cycle time?
- b. (2 points) How large should the lots be?
- c. (2 points) What is the average annual cost of holding and setups at the optimal solution?
- d. (3 points) If the producer were obligated to make at least 2 shipments per year for each color of cases, what would be the problem of the optimal policy you found in parts (a) and (b)? What other production policy would you recommend in this case?