

Homework 7

due Wednesday, May 6, 2020

A machine may be in two states: good or bad. It produces an item at the end of each time period. If the machine is bad, the item is bad/defective as well. If the machine is good, then the item is good. A machine, which is good at stage t may become bad at stage $t + 1$ with probability p . A bad machine remains bad, unless replaced. The state of the machine is not visible and can be identified only by inspecting the produced items. An item produced in period t may be inspected immediately at cost I . The inspection is perfect, that is, it distinguishes between good and defective items without mistakes. If the inspection finds the item bad, the machine may be replaced at a cost R . The cost of producing a bad item is C .

- (a) Formulate a finite horizon dynamic programming problem to minimize the cost of operating the machine.
- (b) The initial state of the machine is good. Solve the problem for $p = 0.2$, $I = 1$, $R = 3$, $C = 2$, and $N = 8$.