

SYNDICATE ASSIGNMENT 2: MARKOV CHAINS

DATE GIVEN: MON 28TH JUNE 2021

DATE DUE: TUE 6TH JULY 2021

Case 1: Fleet company Ltd

ABC Company maintains a fleet of long haul trucks that are dispatched from company headquarters once each month. At the end of 30 days on the road the trucks return to Head_quarters for maintenance. The trucks return at staggered periods so that no more than four trucks are in the shop at any one time.

One of the major maintenance expenses is replacement of tires. The current policy is to have the driver call tire service company when a tire failure occurs and have the tire replaced. The average cost for this replacement has been USD 1000 per tire. The company has found that it can purchase truck tires in volume and have them replaced at its own shop for USD 800 each.

The company classifies tires as either A (very good condition), B (fair condition), C (Marginal condition), or D (failed). An examination of maintenance records showed that 70 per cent of tires found to be in class A condition at one monthly inspection would be in class A at the next inspection, 20 per cent of them would be in class B condition. 80 per cent of tires found to be in class B condition would remain in that condition until the next monthly inspection, and 20 per cent of them will be in class C condition through the next inspection, whereas 80 per cent of them will fail while on road. Naturally the failed tire will be replaced with new or class A tires.

The company wants to know if it would be more economical to change all tires found to be in class C condition during each truck's monthly inspection and maintenance period while the truck is in the company shop. The financial manager argues that the company would be changing some tires that would make it another month (the 20 per cent of class C tires that would remain in class C). The maintenance foreman argues that the USD 200 saving per tire would more than compensate for few tires that would be changed unnecessarily. What is the most economical replacement policy?

Case 2: Hope Hospital.

Hope Hospital operates on a charity basis. All expenses are paid by a non-governmental organization (NGO). Recently the Board of Governors of the hospital has been complaining about the size of the budget and insisting that the hospital cut expenses. The major concern area has been the cost of keeping patients in intensive care unit. The cost has averaged \$ 1000 per week per person compared to only \$ 500 per week per person for keeping patients in the wards.

Past history shows that of those patients in ICU at the beginning of the week, 50 per cent will be there at the end of the week and 50 per cent will be moved to a ward. Of the patients in the wards at the beginning of the week, 50 per cent will be there at the end of the week, 10 per cent will get worse and be transferred to the ICU. 85 per cent will remain outpatients at the end of the week, 10 per cent will be admitted to the ward and 5 per cent will be admitted to ICU.

The Board of Governors believes that the criteria for keeping patients in ICU are too strict and has instructed the ICU staff to relax the criteria so that only 40 per cent of the ICU patients remain in ICU each week and 60 per cent are transferred to wards. The staff insist that if this is done 20 per cent of the ward patients will be going into ICU each week and only 30 per cent will be transferred to outpatient status.

Required: Using Markov chain analysis, will the policy advocated by the Board of Governors actually save the money?