



THE INVENTORY CONTROL PROBLEM WITH A FINITE HORIZON ADMITS MULTIPLE OPTIMAL SOLUTIONS

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Abstract. The inventory control problem with a finite horizon is concerned with the holding of a stock of a commodity in order to satisfy the demand for the commodity over a specified period. The objective is to find the number of procurements and the timing of these procurements that minimizes the cost of procuring and carrying the stock. It is shown that there are demand rates for which the archetypical problem with a fixed number of procurements has two minima. Consequently the problem of finding the number of procurements and the timing of these procurements has multiple solutions. Generalizations of the basic problem are also considered, demonstrating that a body of results concerning these models in the Management Science and Operations Research literature are false. The demand rates exhibited are smooth, positive and have a derivative with fixed sign. So the multiplicity cannot be attributed to a property that is abnormal with regard to applications. The proof is constructive and based on a detailed mathematical analysis of the problem with a demand rate that is piecewise linear, and mollification.

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