

AN INTRODUCTION TO FINANCIAL MATHEMATICS

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1) (Secretary problem). A manager chooses one secretary out of N candidates which arrive at random. The candidates can be ranked in a linear order so that there are no equal candidates. The candidates arrive one in a day in consecutive days and once rejected they do not appear again. The manager wants to maximize the expectation of the rank of the chosen secretary. Formulate the corresponding optimal stopping problem, find the optimal stopping time and the corresponding maximal expectation of the rank.

2) (Stopping game version of the secretary problem) In addition to the manager of the company A described above there is a manager of a rival company B who wants the manager of the company A to choose as bad secretary as possible (with the lowest possible rank). To do this he has a possibility to stop future candidates from arriving (starting from tomorrow) for interview to the company A but has to pay some penalty for doing that. If nobody arrives for interview then A hires the candidate who appeared last for the interview. Formulate the corresponding optimal stopping (Dynkin's) game and describe optimal stopping times of the companies A and B together with the equilibrium price of the game (expectation of the rank of a chosen candidate).