

1989 年美国大学生数学建模竞赛 MCM 试题

1989 MCM A: The Midge Classification Problem

Two species of midges, Af and Apf, have been identified by biologists Grogan and Wirth on the basis of antenna and wing length (see Figure 1). It is important to be able to classify a specimen as Af or Apf, given the antenna and wing length.

1. Given a midge that you know is species Af or Apf, how would you go about classifying it?
2. Apply your method to three specimens with (antenna, wing) lengths (1.24,1.80),(1.28,1.84),(1.40,2.04).
3. Assume that the species is a valuable pollinator and species Apf is a carrier of a debilitating disease. Would you modify your classification scheme and if so, how?

1989 MCM B: Aircraft Queueing

A common procedure at airports is to assign aircraft (A/C) to runways on a first-come-first-served basis. That is, as soon as an A/C is ready to leave the gate ("push-back"), the pilot calls ground control and is added to the queue. Suppose that a control tower has access to a fast online database with the following information for each A/C:

1. the time it is scheduled for pushback;
2. the time it actually pushes back; the number of passengers who are scheduled to make a connection at the next stop, as well as the time to make that connection; and
3. the schedule time of arrival at its next stop Assume that there are seven types of A/C with passenger capacities varying from 100 to 400 in steps of 50. Develop and analyze a mathematical model that takes into account both the travelers' and airlines' satisfaction.