

# 1995 年美国大学生数学建模竞赛 MCM 试题

## 1995 MCM A: Helix Construction

A small biotechnological company must design, prove, program and test a mathematical algorithm to locate “in real time” all the intersections of a helix and a plane in general positions in space. Design, justify, program and test a method to compute all the intersections of a plane and a helix, both in general positions (at any locations and with any orientations) in space. A segment of the helix may represent, for example, a helicoidal suspension spring or a piece of tubing in a chemical or medical apparatus. Theoretical justification of the proposed algorithm is necessary to verify the solution from several points of view, for instance, through mathematical proofs of parts of the algorithm, and through tests of the final program with known examples. Such documentation and tests will be required by government agencies for medical use.

## 1995 MCM B: Faculty Compensation

Aluacha Balaclava College, and undergraduate facility, has just hired a new Provost whose first priority is the institution of a fair and reasonable faculty-compensation plan. She has hired your consulting team to design a compensation system that reflects the following circumstances and principles: [Three paragraphs of details omitted] Design a new pay system, first without cost-of-living increases. Incorporate cost-of-living increases, and then finally, design a transition process for current faculty that will move all salaries towards your system without reducing anyone's salary. The Provost requires a detailed compensation system plan for implementation, as well as a brief, clear, executive summary outlining the model, its assumptions, strengths, weaknesses and expected results, which she can present to the Board and faculty. [A detailed table of current salaries is omitted.]