ARBITRATING DISPUTES

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Area of Application: economics
Calculus needed: definition of the derivative, derivative of polynomials, maximization on an interval.
Related mathematics: utility theory, axiomatic systems in social science.

An Arbitration Problem

Management and the Union are negotiating over a new contract. Each side has concessions it wishes to get from the other. The Union is asking for a one dollar per hour across-the-board raise and a package of increased pension benefits. Management is concerned that the fifteen minute morning coffee break is being abused—workers are straggling back late and the assembly line is being disrupted—and would like to eliminate it. Management would also like to automate one of the checkpoints on the line, which would eliminate four union jobs.

Negotiations so far have failed to produce any agreement, and you have been brought in as an outside arbitrator. How can you propose a fair settlement of these issues? Indeed, what would “fair” mean in a context like this?

Utility Theory

The first thing an arbitrator would need to do would be to find out how Management and the Union feel about the issues being discussed. As a first step, we could sit down with them individually and ask them to rank the individual items

A: automation of the checkpoint
C: elimination of the coffee break
P: the pension benefit package
R: the one dollar raise
SQ: the status quo (no change from the present)

from least preferred to most preferred. Suppose we get the following results:

Management: \( R, P, SQ, A = C. \)

The Union: \( A, C, SQ, P, R. \)