

THE WORLD OF MATHEMATICS

MATHEMATICS AND LAW

by

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Acts of Parliament are allowed to contain words but not mathematical formulas. The problems in trying to say something mathematical without using mathematics can be seen in the following extract from the Australian Social Security Act, about how long a migrant must have been living in Australia before being eligible to receive an age pension:

"where

- a) A claimant has had more than one period of residence in Australia.
- b) The longest of those periods is less than 10 years but is not less than 5 years; and
- c) the aggregate of those periods exceeds 10 years the period specified in paragraph 1 (b) shall, in relation to the claimant, be deemed to be reduced by the excess "

There seems to be some formula that is meant by the last phrase, but what it is is a mystery.

The part of mathematics that is most relevant to the law is simple arithmetic. needed to add up fees, compare different tax minimisation schemes and so on. After that the theory of probability is perhaps the most important.

An example is the case of T.N.T. Management v Brooks in the High Court of Australia in 1979. A collision had occurred between a van and a semi-trailer. both drivers were killed and there were no eye-witnesses. Damages were payable to the semi-trailer driver's wife if it could be established that negligence by the van driver was more probable than not; damages were still payable if both drivers were negligent. Mr Justice Murphy (the time spoken of being before his own difficulties in the courts) argued that negligence by the two drivers was equally probable, since there was no evidence that made one

driver more probably responsible for the accident than the other. There was also a probability that both were negligent; therefore the total probability that the van driver was negligent was greater than a half, and damages ought to be paid.

In symbols, let x = probability that van driver was negligent
 y = probability that semi-trailer driver was negligent

and let z = probability that both drivers were negligent

Then $2x + y = 1$ (probabilities add up to 1)

$$\text{so } x + \frac{1}{2}y = \frac{1}{2}$$

$$\text{so } x + y > \frac{1}{2}.$$

The court did award damages though it relied on some other evidence as well.

More about probability in the law can be found in the book Evidence, Proof and Probability by Sir Richard Eggleston.

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