HOW TO PROVE IT

By Dana Angluin with apologies to G. Polya
and contributions from the Yale Computer Science Department.

- **proof by example:**

The author gives only the case n = 2 and suggests that it contains most of the ideas of the general proof.

- **proof by intimidation:**

'Trivial.'

- **proof by vigorous handwaving:**

Works well in a classroom or seminar setting.

- **proof by cumbersome notation:**

Best done with access to at least four alphabets and special symbols.

- **proof by exhaustion:**

An issue or two of a journal devoted to your proof is useful.

- **proof by omission:**

'The reader may easily supply the details.' 'The other 253 cases are analogous.' '...'

- **proof by obfuscation:**

A long plotless sequence of true and/or meaningless syntactically related statements.

- **proof by wishful citation:**

The author cites the negation, converse, or generalization of a theorem from the literature to support his claims.

- **proof by funding:**

How could three different government agencies be wrong?

- **proof by eminent authority:**

'I saw Karp in the elevator and he said it was probably NP-complete.'

- **proof by personal communication:**

'Eight-dimensional colored cycle stripping is NP-complete [Karp, personal communication].'

- **proof by reduction to the wrong problem:**

'To see that infinite-dimensional colored cycle stripping is decidable, we reduce it to the halting problem.'

- **proof by reference to inaccessible literature:**

The author cites a simple corollary of a theorem to be found in a privately circulated memoir of the Slovenian Philological Society, 1883.

- **proof by importance:**

A large body of useful consequences all follow from the proposition in question.

- **proof by accumulated evidence:**

Long and diligent search has not revealed a counterexample.

- **proof by cosmology:**

The negation of the proposition is unimaginable or meaningless. Popular for proofs of the existence of God.

- **proof by mutual reference:**

In reference A, Theorem 5 is said to follow from Theorem 3 in reference B, which is shown to follow from Corollary 6.2 in reference C, which is an easy consequence of Theorem 5 in reference A.

- **proof by metaproof:**

A method is given to construct the desired proof. The correctness of the method is proved by any of

these techniques.

- **proof by picture**

A more convincing form of proof by example. Combines well with proof by omission.

- **proof by vehement assertion:**

It is useful to have some kind of authority relation to the audience.

- **proof by ghost reference:**

Nothing even remotely resembling the cited theorem appears in the reference given.

- **proof by forward reference:**

Reference is usually to a forthcoming paper of the author, which is often not as forthcoming as at first.

- **proof by semantic shift:**

Some standard but inconvenient definitions are changed for the statement of the result.

- **proof by appeal to intuition:**

Cloud-shaped drawings frequently help here.