

# Proofs and Programs

April 3, 2019

0. Which of the following propositions are *constructively true*:
  - The first digit of  $\pi$  is 3 or the winning numbers this weekend will be 3, 14, 21, 25, 34 and 35.
  - $2^{123456789} - 1$  is odd and the winning numbers this weekend will be 3, 14, 21, 25, 34 and 35.
  - Every program which loops never stops.
1. Critically discuss the following concepts: “correctness of an algorithm”, “the correctness of a program”.
2. Contrast the notions of “theorem”, “model”, “thesis”.
3. Comment the following statement:

D. Zeilberger: The real work of us mathematicians, from now until, roughly, fifty years from now, when computers won't need us anymore, is to make the transition from human-centric math to machine-centric math as smooth and efficient as possible.
4. Comment the following statement:

D. Knuth: ... programming demands a significantly higher standard of accuracy. Things don't simply have to make sense to another human being, they must make sense to a computer.