

Practice problems.

- (1) This problem concerns the cubic equation $x^3 + 6x - 20 = 0$.
 - (a) Find all three roots of the equation using Cardano's formula.
 - (b) Now find the roots without Cardano's formula, using the fact that one of the roots is rational.
- (2) Consider the two plane curves defined by $y = x^2$ and $y = x^3$. Find all points of intersection, including points at infinity (if any), with correct multiplicity.
- (3) To what degree, and how, was Hilbert's First Problem resolved?
- (4) What is the Dehn invariant of a regular tetrahedron of side length 1?
- (5) Explain how you know that $\log_2(3)$ is transcendental.
- (6) Identify some important mathematical contribution made by each of: Scipione del Ferro, Evariste Galois, Farkas Bolyai, Janos Bolyai, Georg Cantor, Felix Klein, David Hilbert, Ernst Zermelo, Kurt Gödel, Alan Turing, Paul Cohen, Yuri Matiyasevich