

Mathematics 2200H – Mathematical Reasoning

TRENT UNIVERSITY, Fall 2017

Assignment #1

Sir! Yes, sir! General Formula, sir!

Due on Thursday, 14 September.

Consider the following:

PROBLEM. *Find a general formula for two squares whose sum = 2.*

What does this problem ask for? Presumably, a formula (or formulas) for u and v that generates all the possible u and v such that $u^2 + v^2 = 2$. One complication is that the possible answers differ depending on just what kind of numbers u and v are allowed to be and what operations and functions we are allowed to use in the formulas. In what follows, unless stated otherwise, please stick to the basic arithmetic and algebraic operations (that is, $+$, $-$, \cdot , $/$, powers, and roots) and the specified number systems.

1. Solve the problem assuming that u and v are required to be integers. [1]
2. Solve the problem assuming that u and v are only required to be real numbers. [2]
3. Solve the problem without using roots or fractional powers assuming that u and v are only required to be real numbers. [5]
4. How do your answers to **2** and **3** change if u and v could be complex numbers? [2]

Numbers

A number will find
fulfillment enough
in knowing its mind
and doing its stuff.

A grook by Piet Hein.