Handout for MATH 036: Study Questions for "Crystals. The General Mathematical Idea Of Symmetry" (*Symmetry*, Chapter 4)

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(i) What is the relation between symmetry and physics?

(ii) On p. 129 Weyl states that "[...] physics has revealed that an absolute standard length is built into the constitution of the atom, or rather into that of the elementary particles, in particular the electron with its definite charge and mass.". What is that absolute standard length? (Hint: see p. 133)

(iii) Consider the four dimensional continuum of space-time described on p. 131. What are the three dimensional layers of simultaneity and the one dimensional fibers of world-lines (or rest)? Draw a caricature that depicts them.

(iv) What does objectivity mean, in the context of general relativity?

(v) What is Klein's Erlangen program?

(vi) How does Weyl define an "algebraist"?

(vii) Research the life of Évariste Galois. What is the imaginary number i? What is the Galois group of the complex numbers over the real numbers?