Handout for MATH 036: Study Questions for "Ornamental Symmetry" (*Symmetry*, Chapter 3)

Alp Uzman

Last Revised: October 21, 2017

(i) Research the problem of "sphere packing". (Hint: https://youtu.be/ciM6wigZK0w)

(ii) Explain why honeycombs have the hexagonal pattern.

(iii) On p. 89 Weyl claims that "[...] a hexagonal net covering the sphere is impossible owing to a fundamental formula of topology." What is that fundamental formula. (Hint: Euler.)

(iv) What is the fundamental concept of metric geometry? Research what a distance function is. What is the relationship between a distance function and the fundamental concept of metric geometry?