Exercise Set 1 – Arithmetic Geometry, Frank Thorne (thorne@math.sc.edu)

Due Monday, February 3, 2020

(1) Suppose that Π is a plane in $\mathbb{R}^3$, given by an equation of the form

$$ax + by + cz = 0.$$

Prove that the vector $(a, b, c) = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$ is normal to Π – in other words, that whenever $P, Q \in \Pi$ we have that $\overrightarrow{PQ}$ is orthogonal to (a, b, c).

(2) Ch. 1.2, 21, 32.

(3) Ch. 1.3, 16, 25.

(4) Ch. 1.4, 11, 14, 23, 25.

(5) Ch. 1.5, 2, 3, 6, 8, 9, 18, 20, 23, 28.