MTH 385 Homework due 2022-01-31

Exercise 1 (1.5.2). *Show that the square of* $2q+1$ *is in fact of the form* $4s+1$, *and hence explain why every integer square leaves remainder* 0 *or* 1 *on division by* 4.

Solution. □

Exercise 2 (2.1.1). *Explain how Common Notions 1 and 4 may be interpreted as the transitive and reflexive properties. Note that the natural way to write Common Notion 1 symbolically is slightly different from the statement of transitivity above.*

Solution. □

Exercise 3 (2.1.2). *Show that the symmetric property follows from Euclid's Common Notions 1 and 4.*

Exercise 4 (2.2.1). *Show that* $\frac{\textit{circumradius}}{\textit{inradius}} = \sqrt{3}$ *for both the cube and the octahedron.*

Solution. □

Exercise 5 (2.2.2). *Check Pacioli's construction: use the Pythagorean theorem to show that* $AB = BC = CA$ *in Figure 2.2. (It may help to use the additional fact that* $\tau = (1+\sqrt{5})/2$ *satisfies* $\tau^2 = \tau + 1$.*)*

Solution. □