

Math 542 HW #1

due Friday, 8/31

1: #I.4.4 from Palka.

Note (requires linear algebra): The parallelogram law characterizes *inner product spaces* among all *normed vector spaces*. Check that the identity $\|v-w\|^2 + \|v+w\|^2 = 2(\|v\|^2 + \|w\|^2)$ holds whenever v and w are elements of an inner product space $(V, \langle \cdot, \cdot \rangle)$, where $\|v\| = \langle v, v \rangle^{1/2}$.

2: #I.4.6 (i), (ii), (v) and (ix) from Palka.

3: #1.4.19 from Palka.

4: #1.4.21 and #I.4.39 from Palka (do these two problems together).

5: #I.4.38 from Palka. Some pictures are very helpful for this one.

6: #I.4.57 from Palka. After our discussion of the extended complex plane and Riemann sphere, and in view of this problem and #I.4.19, we will treat circles and lines in \mathbb{C} on an equal footing.

7 (Extra credit): #I.4.60 from Palka.