

## Homework 8

Due March 24th on paper at the beginning of class. Justify your answers. Please let me know if you have a question or find a mistake.

1. Exercise 2.11(1) of <https://www.math.purdue.edu/~kdatchev/442/geodesics.pdf>
2. Problems 3-1, 3-3(c), 3-5, and 3-6 from page 49 of Spivak.

*Hint:* You may use without proof the fact that if  $E$  is a set,  $f: E \rightarrow \mathbb{R}$  is a bounded function, and  $c \in \mathbb{R}$ , then  $\sup_E cf = c \sup_E f$  when  $c \geq 0$  and  $\sup_E cf = c \inf_E f$  when  $c \leq 0$ . For 3-6, use the results of 3-3(c) and 3-5. You may also find it helpful to show that  $\sup_E |f| - \inf_E |f| \leq \sup_E f - \inf_E f$  for any set  $E$  and any bounded function  $f: E \rightarrow \mathbb{R}$ . For this you may use without proof the fact that any bounded function  $f: E \rightarrow \mathbb{R}$  obeys either  $\sup_E |f| = \sup_E f$  or  $\sup_E |f| = \sup_E(-f)$ .