

**Section 4.5:** 7, 8.

**Section 5.1:** 6, 8, 10.

**Section 5.2:** 1, 2.

Additional problems:

1. Show that, for every  $x \in \mathbb{R}$ , the following hold

$$\lim_{y \rightarrow +\infty} \tan(x + iy) = i, \quad \lim_{y \rightarrow -\infty} \tan(x + iy) = -i.$$

2. Show that the function

$$f(z) = \frac{1}{2} \log \left( \frac{z-1}{z+1} \right)$$

is analytic on the set  $\mathbb{C} \setminus [-1, 1]$ , where  $\log$  is the principal branch of the log function, and show that

$$f'(z) = \frac{1}{z^2 - 1}.$$