Math 360 HW

I. Week of April 14 Sheet

1. (Kiselev): $250, 251, 258, 259, 265, 266, 268, 269$.
2. (Pressley): $6.3.4, 6.3.7, 6.4.1 - 6.4.5$.

II. Week of April 21 Sheet

1. Read pages $88 - 97$ from Courant's "What is Mathematics" text (free link our webpage) in order to review complex numbers from high school. Do the exercises $1 - 8$ on p. 97.
2. For this problem we identify the complex plane $\mathbb{C}$ with the xy-plane in $\mathbb{R}$.
   (a) Show that the first fundamental form $I = dx^2 + dy^2$ on the xy-plane becomes $I = dzd\bar{z}$ in $\mathbb{C}$ when $dz = dx + idy$ and $d\bar{z} = dx - idy$.
   (b) Since the isometries of the plane are compositions of rotations, translations and reflections in the plane, show that all isometries of $\mathbb{C}$ with the above first fundamental form are of the form $f(z) = az + b$ or $f(z) = a\bar{z} + b$ when $\|a\| = 1$.
   (c) Since the conformal maps of the plane are compositions of rotations, translations, reflections, and dilations in the plane, show that all corresponding isometries of $\mathbb{C}$ with the above first fundamental form are of the form $f(z) = az + b$ or $f(z) = a\bar{z} + b$.
   (d) Show that the conformal factor in conformal maps $f(z) = az + b$ or $f(z) = a\bar{z} + b$ are $\lambda = \|a\|$.
3. (Kiselev): $278, 305, 320, 321$.
4. (Pressley): $6.5.1, 6.5.2, 7.1.1, 7.1.2, 7.2.1$.