Solutions to Homework Assignment 3

MATH 345-01

Section 6, Page 16

1,2,3

1. (a) $\overline{\overline{z}+3i} = \overline{\overline{z}} + \overline{3i} = z - 3i$.

   (b) $\overline{iz} = \overline{i}\overline{z} = -i\overline{z}$.

   (c) $\overline{(2+i)^2} = \overline{(2+i)}^2 = (2-i)^2 = 3 - 4i$.

   (d) $|(2\overline{z}+5)(\sqrt{2}-i)| = |\overline{2z+5}||\sqrt{2}-i| = \sqrt{3}|2z+5|$ since 5 is real.

2. (a) $\mathrm{Re}(\overline{z}-i) = \mathrm{Re}(x-iy-i) = x = \mathrm{Re}(z)$. This is the vertical line $x = 2$.

   (b) $|2z-i| = 4 \implies |z - i/2| = 2$. This is the circle centered at $i/2$ of radius 2.

3. Property (3) works just like addition. Property (4):

$$\begin{aligned}
\overline{z_1 z_2} &= \overline{(x+iy)(a+ib)} \\
&= \overline{ax - by + i(bx+ay)} \\
&= ax - by - i(bx+ay) \\
&= (x-iy)(a-ib) \\
&= \overline{z_1}\,\overline{z_2}.
\end{aligned}$$