Solutions to Homework Assignment 3

MATH 345-01
Section 5, Page 13
1,2,3

1. (a) $\overline{z + 3i} = \overline{z} + 3i = z - 3i$.
   (b) $\overline{iz} = i\overline{z} = -i\overline{z}$.
   (c) $(2 + i)^2 = (2 - i)^2 = 3 - 4i$.
   (d) $|2z + 5|\sqrt{2 - i} = \sqrt{3}|2z + 5|$ since 5 is real.

2. (a) $\text{Re}(z - i) = \text{Re}(x - iy - i) = x = \text{Re}(z)$. 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):

   $\overline{z_1z_2} = \overline{(x + iy)(a + ib)}$
   $= \overline{ax - by + i(bx + ay)}$
   $= ax - by - i(bx + ay)$
   $= (x - iy)(a - ib)$
   $= \overline{z_1z_2}$. 