

# Multiplication of Complex Numbers

Now for multiplication:

$$\begin{aligned}(a + ib)(A + iB) &= aA + iaB + ibA + i^2bB \\ &= aA + iaB + ibA + (-1)bB \\ &= (aA - bB) + i(aB + bA)\end{aligned}$$

The multiplication on the left is what we are defining. The multiplications in the third right-hand side are multiplications of real numbers. Note how we have used  $i^2 = -1$  to simplify and get us back to a complex number symbol.

**Ex:**

$$(2 + 3i) + (4 + 5i) = 6 + 8i$$

$$(2 + 3i)(4 + 5i) = 8 + 10i + 12i + 15i^2 = 8 + 22i - 15 = -7 + 22i$$