

*HAP 1.3 Complex Numbers*

## 1. Definitions

(a) Imaginary Unit

(b) Complex Number

2. Adding  $(3 + 5i) + (-2 + 3i)$ 3. Subtracting  $(6 + 4i) - (3 + 6i)$ 4. Multiplying  $(5 + 3i) \cdot (2 + 7i)$ 5. The Conjugate of  $z$  is written  $\bar{z}$ If  $z = a + bi$  then  $\bar{z} =$ **(b)**  $z \cdot \bar{z} =$ 6. Find the reciprocal of  $3 + 4i$ 

## 7. Theorems (page 108)

(a) The conjugate of a Real Number  $x$  is(b) If  $z$  and  $w$  are complex numbers, then  $\overline{z + w} =$ (c) If  $z$  and  $w$  are complex numbers, then  $\overline{zw} =$ 8. Powers of  $i$ (a)  $i^1 =$ (b)  $i^2 =$ (c)  $i^3 =$ (d)  $i^4 =$ (e)  $i^{27} =$ (f)  $i^{101} =$

9. Write  $(2 + i)^3$  in standard form.
10. The square root of negative numbers
- (a)  $\sqrt{-1} =$
- (b)  $\sqrt{-4} =$
- (c)  $\sqrt{-8} =$
11. If  $x^2 = -9$  then  $x =$
12. Recall If  $ax^2 + bx + c = 0$  then  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- (a) If the discriminate  $b^2 - 4ac > 0$  then
- (b) If the discriminate  $b^2 - 4ac = 0$  then
- (c) If the discriminate  $b^2 - 4ac < 0$  then
- (d) What can you say about the solutions of  $3x^2 + 4x + 5 = 0$ ?
- (e) What can you say about the solutions of  $2x^2 + 4x + 1 = 0$ ?
- (f) What can you say about the solutions of  $9x^2 - 6x + 1 = 0$ ?
13.  $x^2 - 4x + 8 = 0$