

Practise, Apply, Solve 4.4, page 331

- (a) R, I, C, Q (b) R, Q, C (c) C
 (d) R, Q, C (e) R, Q, C (f) R, Q, C
 (g) R, Q, C (h) R, I, N, W, C, Q
- (a) $4i$ (b) $11i$ (c) $-3i$
 (d) $3\sqrt{2}i$ (e) $-2\sqrt{7}i$ (f) $\pm 5\sqrt{2}i$
- (a) $1 - i$ (b) $2 + 3i$ (c) $-3 + 4i$
 (d) $-7 - 5i$ (e) $11 + 11i$ (f) $2 - \sqrt{2}i$
- (a) yes (b) no (c) yes (d) no
- (a) $\pm 2i$ (b) $\pm 8i$ (c) $\pm 3i$
 (d) $\pm 7i$ (e) $\pm 4\sqrt{2}i$ (f) $\pm 5\sqrt{3}i$
- (a) $2 \pm i$ (b) $1 \pm 4i$ (c) $2 \pm 3i$
 (d) $\frac{-1}{2} \pm \frac{1}{2}i$ (e) $\frac{1}{4} \pm \frac{\sqrt{7}}{4}i$ (f) $-1 \pm \sqrt{5}i$
- (a) -16 , two complex roots (b) 16 , two real roots
 (c) -24 , two complex roots (d) 0 , one real root
- (a) $x = -1 \pm 2i$ (b) $x = -1, x = 3$
 (c) $\frac{2}{5} \pm \frac{\sqrt{6}}{5}i$ (d) 4
- (a) $x = 3, x = -8$ (b) $x = 2 \pm \sqrt{5}$
 (c) $1 \pm \sqrt{\frac{2}{3}}$ (d) $-1 \pm 2i$
- (a) $x = -2i, (x + 2i)(x - 2i) = 0$
 (b) $x = 2 + i, (x - 2 - i)(x - 2 + i) = 0$
 (c) $x = 1 - 3i, (x - 1 - 3i)(x - 1 + 3i) = 0$
 (d) $x = -1 + i, (x + 1 + i)(x + 1 - i) = 0$

- (e) $x = 3 + 4i, (x - 3 + 4i)(x - 3 - 4i) = 0$
 (f) $x = -12 - 5i, (x + 12 + 5i)(x + 12 - 5i) = 0$
- (a) $(x + 2 - i)(x + 2 - i)$ (b) $(x + 2 - 3i)(x + 2 + 3i)$
 (c) $\left(x - \frac{1}{2} - \frac{\sqrt{3}}{2}i\right)\left(x - \frac{1}{2} + \frac{\sqrt{3}}{2}i\right)$
 (d) $(x - 1 - 5i)(x - 1 + 5i)$
 - (a) $\frac{-1}{3} \pm \frac{\sqrt{2}}{3}i$ (b) $\frac{3}{4} \pm \frac{\sqrt{47}}{4}i$
 (c) $\frac{1}{3} \pm \frac{\sqrt{29}}{3}i$ (d) $\frac{-1}{10} \pm \frac{\sqrt{139}}{10}i$
 - $2 + 3i, 2 - 3i$
 - $2.5 + 0.5^3i, 2.5 - 0.5\sqrt{3}i$
 - No, the graph of $n(t) = -0.75t^2 + 6t + 51$ has a maximum value of 63 when $x = 4$, the fifth month of sales. Thus, the company can sell at most 63 000 units according to this model.
 - A complex number can be written in the form $a + bi$, where a and b are real numbers and i is a non-real number such that $i^2 = -1$. The real number system includes all rational and irrational numbers, contains the set of natural numbers, whole numbers, and integers.
 - Complex numbers in form $a + bi$ are useful in solving quadratic equations because they can be used to show non-real roots.
 - $x = \pm 3, x = \pm 3i$
 - Complex numbers cannot be ordered.
 - $x = -1, x = \frac{1}{2} \pm \frac{\sqrt{3}}{2}i$