Section 1: Roots and coefficients

Exercise level 1

1. Find the sum and product of the roots of the following quadratic equations.
   (i) $2x^2+9x-5=0$
   (ii) $5x^2-x+2=0$
   (iii) $3x(x+2)=4x-5$

2. The roots of a cubic equation are α, β and γ. For each of the following cubic equations, find the value of $\alpha+\beta+\gamma$, $\alpha\beta+\beta\gamma+\gamma\alpha$ and $\alpha\beta\gamma$.
   (i) $x^3-3x^2+2x+4=0$
   (ii) $2x^3+5x-3=0$
   (iii) $3x^3+x^2-4x-1=0$

3. The roots of $3x^2+11x-4=0$ are α and β.
   Find the quadratic equation with roots
   (i) $\alpha-2$ and $\beta-2$
   (ii) 3α and 3β.

4. If $p+q=5$ and $p^2+q^2=19$ find the value of pq and hence write down a quadratic equation with roots p and q.

5. The roots of the quadratic equation $x^2+x-6=0$ are α and β. Find the value of $\alpha+\beta+\frac{1}{\alpha}+\frac{1}{\beta}$.

6. Given that –1 and 4 are two roots of $x^3+5x^2+ax+b=0$ find the third root and values for a and b.

