Exercise level 2

1. Find
   (i) the coefficient of x^4 in the expansion of $(1+2x)^{15}$
   (ii) the coefficient of x^{23} in the expansion of $(3-x)^{25}$
   (iii) the coefficient of x^2 in the expansion of $\left(x+\dfrac{1}{x}\right)^{10}$.

2. Without using a calculator, evaluate
   (i) $_{19}C_{10} - {}_{19}C_9$
   (ii) $_{10}C_1 - {}_9C_1$
   (iii) $_9C_7 \div {}_9C_6$

3. Write out fully $\mathrm{f}(x) = (\sin x + \cos x)^4$ and hence find $\mathrm{f}(45°)$.

4. Expand the expression
   $$(1+x)^4(1-x)^7$$
   up to and including the term in x^2.

5. (i) Write down the first three terms in the binomial expansion of $(1-x)^{15}$.
   (ii) By substituting $x = 0.01$, find an approximate value for 0.99^{15}.
   (iii) Find the percentage error in using this approximate value instead of the true value.

6. (i) Write down the first four terms in the binomial expansion of $\left(1+\dfrac{x}{2}\right)^9$.
   (ii) By substituting $x = 0.1$, find an approximate value for 1.05^9.
   (iii) Find the percentage error in using this approximate value instead of the true value.

7. Expand $\mathrm{f}(x) = (2-x)^3\left(1-\frac{1}{x}\right)^2$ and check your answer by finding $\mathrm{f}(1)$.

8. (i) Write out the first 4 terms of the expansion of $(1+x^2)^8$.
   (ii) Use your expansion to find an approximation to $(1.01)^8$ to three decimal places.