Assignment 2.

1. Expand $\dfrac{2-x^2}{\sqrt{4+3x}}$ in ascending powers of x, up to and including the term in x^3, simplifying the coefficients. [6]

2. (a) Simplify the expression $(\sqrt{1+x}+\sqrt{1-x})(\sqrt{1+x}-\sqrt{1-x})$. [2]

   (b) Using this result, expand $\dfrac{1}{\sqrt{1+x}+\sqrt{1-x}}$ in ascending powers of x, up to and including the term in x^4. [5]

3. When $(2-3x)(1+ax)^{\frac{3}{4}}$, where a is a constant, is expanded in ascending powers of x, the coefficient of the term in x is zero.

   (a) Find the value of a. [3]

   (b) When a has this value, find coefficient of the term in x^4 in the expansion of $(2-3x)(1+ax)^{\frac{3}{4}}$. [4]

4. It is given that $f(x) = \dfrac{x^2}{(x+1)(x-1)^2}$.

   (a) Write $f(x)$ in terms of partial fractions. [4]

   (b) Hence expand $f(x)$ in ascending powers of x, up to and including the term in x^4. [4]

5. (†) Let $f(x) = \sqrt{x^6 + 3x^5}$. By considering the expansion of $\left(1 + \frac{3}{x}\right)^{\frac{1}{2}}$, find the term which is independent of x in the expansion of $f(x)$ in powers of $\frac{1}{x}$, for $|x| > 3$. [6]

   Show that there is no term independent of x in the expansion of $f(x)$ in powers of x, for $|x| < 3$. [2]

Total mark of this assignment: $28 + 8$.

The symbol (†) indicates a bonus question. Finish other questions before working on this one.