1 Find the first four terms of the binomial expansion of $\sqrt[3]{1-2x}$. State the set of values of x for which the expansion is valid. **[6]**

2 Given the binomial expansion $(1 + qx)^p = 1 - x + 2x^2 + \ldots$, find the values of p and q. Hence state the set of values of x for which the expansion is valid. **[6]**

3 Find the first three terms in the binomial expansion of $\frac{1}{(3-2x)^3}$ in ascending powers of x. State the set of values of x for which the expansion is valid. **[7]**

4 Find the first three terms in the binomial expansion of $\frac{1+2x}{(1-2x)^2}$ in ascending powers of x. State the set of values of x for which the expansion is valid. **[7]**

5 Show that $(1 + 2x)^{\frac{1}{3}} = 1 + \frac{2}{3}x - \frac{4}{9}x^2 + \ldots$, and find the next term in the expansion.

State the set of values of x for which the expansion is valid. **[6]**

6 **(i)** Find the first three terms in the binomial expansion of $\frac{1}{\sqrt{1-2x}}$. State the set of values of x for which the expansion is valid. [5]

(ii) Hence find the first three terms in the series expansion of $\frac{1+2x}{\sqrt{1-2x}}$. [3]

7 **(i)** Find the first three non-zero terms of the binomial expansion of $\frac{1}{\sqrt{4 - x^2}}$ for $|x| < 2$. [4]

(ii) Use this result to find an approximation for $\int_0^1 \frac{1}{\sqrt{4 - x^2}} \mathrm{d}x$, rounding your answer to 4 significant figures. [2]

(iii) Given that $\int \frac{1}{\sqrt{4 - x^2}} \mathrm{d}x = \arcsin\left(\frac{1}{2}x\right) + c$, evaluate $\int_0^1 \frac{1}{\sqrt{4 - x^2}} \mathrm{d}x$, rounding your answer to 4 significant figures. [1]