

6 (a) Find the first three terms, in ascending powers of x , of the binomial expansion of $\frac{1}{\sqrt{4+x}}$

[3 marks]

6 (b) Hence, find the first three terms of the binomial expansion of $\frac{1}{\sqrt{4-x^3}}$

[2 marks]

6 (c) Using your answer to part **(b)**, find an approximation for $\int_0^1 \frac{1}{\sqrt{4-x^3}} dx$, giving your answer to seven decimal places.

[3 marks]

6 (d) (i) Edward, a student, decides to use this method to find a more accurate value for the integral by increasing the number of terms of the binomial expansion used.

Explain clearly whether Edward's approximation will be an overestimate, an underestimate, or if it is impossible to tell.

[2 marks]

6 (d) (ii) Edward goes on to use the expansion from part **(b)** to find an approximation for $\int_{-2}^0 \frac{1}{\sqrt{4-x^3}} dx$

Explain why Edward's approximation is invalid.

[2 marks]