

(a) Find the quotient and remainder when  $8x^3 + 4x^2 + 2x + 7$  is divided by  $4x^2 + 1$ . [3]

(b) Hence find the exact value of  $\int_0^{\frac{1}{2}} \frac{8x^3 + 4x^2 + 2x + 7}{4x^2 + 1} dx$ . [5]