

Question 5**(5 marks)**

- (a) Given that $\frac{7x^2 - 12x + 2}{(x-2)(x^2+2)} = \frac{a}{x-2} + \frac{bx}{x^2+2}$ determine the values of a and b .
(2 marks)

- (c) By using the substitution $x = \sqrt{2} \sin \theta$, evaluate the total area enclosed by the heart-shaped figure, and hence see why it can be said that ' π is at the heart of mathematics'.
- (5 marks)

- (b) Show that the total area enclosed by the heart-shaped figure is given by:

$$Area = 4 \int_0^{\sqrt{2}} \sqrt{2 - x^2} \, dx.$$

(2 marks)