7. The continuous random variable X has probability density function

$$f(x) = \begin{cases} \frac{1}{4}x - \frac{1}{64}x^3 & 0 \leqslant x \leqslant 4 \\ 0 & \text{otherwise} \end{cases}$$

(a) Show that the median of X is 2.165 to 3 decimal places.

(5)

The continuous random variable Y has probability density function

$$f(y) = \begin{cases} \frac{4}{255}y^3 & 1 \leqslant y \leqslant 4 \\ 0 & \text{otherwise} \end{cases}$$

(b) Show that $\text{Var}\left(\frac{1}{Y}\right) = \frac{66}{7225}$

(*Solutions relying entirely on calculator technology are not acceptable.*)

(5)

(c) Hence find $\text{Var}\left(4 - \frac{5}{Y}\right)$

(2)

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Question 7 continued

Question 7 continued

(Total for Question 7 is 12 marks)

TOTAL FOR PAPER IS 75 MARKS

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