2. $$f(x) = x^2 - \frac{7x - 4\sqrt{x}}{x^3} \qquad x > 0$$

(a) Show that the equation $f(x) = 0$ has a root α in the interval [0.3, 0.4]

(2)

(b) Determine $f'(x)$.

(3)

(c) Using $x_0 = 0.3$ as a first approximation for α, apply the Newton–Raphson procedure once to $f(x)$ to determine a second approximation for α, giving your answer to 3 decimal places.

(2)

The equation $f(x) = 0$ has another root β in the interval [1.3, 1.5]

(d) Use linear interpolation once on the interval [1.3, 1.5] to determine an approximation for β, giving your answer to 3 decimal places.

(2)

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Question 2 continued

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Question 2 continued

(Total for Question 2 is 9 marks)