2. $$f(x) = 10 - 2x - \frac{1}{2\sqrt{x}} - \frac{1}{x^3} \qquad x > 0$$

(a) Show that the equation $f(x) = 0$ has a root α in the interval [0.4, 0.5]

(2)

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

(3)

(c) Using $x_0 = 0.5$ as a first approximation to α, apply the Newton-Raphson procedure once to $f(x)$ to find a second approximation to α, giving your answer to 3 decimal places.

(2)

The equation $f(x) = 0$ has another root β in the interval [4.8, 4.9]

(d) Use linear interpolation once on the interval [4.8, 4.9] to find an approximation to 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)