4. $$f(x) = \frac{1}{10}x - \frac{(x-4)^2}{\sqrt{x}} \qquad x > 0$$

(a) Show that the equation $f(x) = 0$ has a root α in the interval [5.0, 5.1]

(2)

(b) Starting with the interval [5.0, 5.1], use interval bisection to determine an interval of width 0.025 which contains α.

(3)

The equation $f(x) = 0$ has another root β in the interval [3.1, 3.3]

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

(3)

(d) Using $x_0 = 3.3$ as a first approximation for β, apply the Newton-Raphson process once to $f(x)$ to determine a second approximation for β, giving your answer to 3 decimal places.

(2)

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Question 4 continued

(Total for Question 4 is 10 marks)