7. $$f(x) = x^{\frac{3}{2}} + x - 3$$

(a) Show that the equation $f(x) = 0$ has a root, α, in the interval [1, 2]

(2)

(b) Starting with the interval [1, 2], use interval bisection twice to show that α lies in the interval [1.25, 1.5]

(3)

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

(ii) Using 1.375 as a first approximation for α, apply the Newton-Raphson process once to $f(x)$ to determine a second approximation for α, giving your answer to 3 decimal places.

(3)

(d) Use linear interpolation once on the interval [1.25, 1.5] to obtain a different approximation for α, giving your answer to 3 decimal places.

(3)

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Question 7 continued

(Total for Question 7 is 11 marks)