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Answer ALL questions. Write your answers in the spaces provided.

1.

$$f(x) = 5 + 4x^2 - \frac{4}{3}x^3 - \frac{7}{2x} \quad x > 0$$

(a) Find $f'(x)$.

(2)

A root α of the equation $f(x) = 0$ lies in the interval $[0.5, 0.6]$.

(b) Using 0.5 as a first approximation to α, apply the Newton-Raphson process once to $f(x)$ to find a second approximation to α. Give your answer to 3 decimal places.

(3)

(c) Show that the equation $f(x) = 0$ has a root β in the interval $[3, 3.5]$.

(2)

(d) Use linear interpolation once on the interval $[3, 3.5]$ to find an approximation to β. Give your answer to 2 decimal places.

(3)

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Question 1 continued

(Total 10 marks)

Q1