7   The curve $y = (x^2 - 2)\ln x$ has one stationary point which is close to $x = 1$.

(a) Show that the x-coordinate of this stationary point satisfies the equation $2x^2 \ln x + x^2 - 2 = 0$.

[2]

(b) Show that the Newton-Raphson iterative formula for finding the root of the equation in part **(a)** can be written in the form $x_{n+1} = \dfrac{2x_n^2 \ln x_n + 3x_n^2 + 2}{4x_n(\ln x_n + 1)}$.

[4]

(c) Apply the Newton-Raphson formula with initial value $x_1 = 1$ to find x_2 and x_3.

[1]

(d) Find the coordinates of this stationary point, giving each coordinate correct to **3** decimal places.

[2]