Question Number	Scheme	Marks
7.(a)	$f(2) = 2.9497...$ or $f(2.1) = -6.0105...$ and $f(2.05) = -1.3160...$	M1A1
	$f(2.025) = 0.86846\ldots$	dM1
	Interval is (2.025, 2.05) oe	A1
		(4)
(b)	$f'(x) = -\frac{7}{2}x^{-\frac{3}{2}} - 5x^4$	M1A1
		(2)
(c)	$x_1 = 2 - \frac{f(2)}{f'(2)} = \left(2 - \frac{2.9497}{-81.237}\right) = 2.04$	M1 A1
		(2)
		Total 8

Notes

(a)

M1: Evaluates (must see numerical values) ***at least one*** of f (2) or f (2.1) **and evaluates** f (2.05)

A1: f (2) ***or*** f (2.1) correct awrt (or truncated) to 1 sf **and** f (2.05) correct awrt (or truncated) to 1 sf

dM1: Evaluates f (2.025)

Dependent on the previous M mark

A1: Needs accuracy for f (2.025) correct to 1 figure truncated or rounded and correct interval. Accept soft or hard brackets here or e.g. root/α/$x \in (2.025, 2.05)$ or root/α/$x \in [2.025, 2.05]$ or 'root belongs to (2.025, 2.05)' etc

Note:

Condone root/α/x is between 2.05 and 2.025 <u>but</u> root/α/$x \in (2.05, 2.025)$ or root/α/$x \in [2.05, 2.025]$ is **A0**

(b)

M1: For attempt at differentiation $\frac{7}{\sqrt{x}} \to ax^{-\frac{3}{2}}$ or $-x^5 \to bx^4$

A1: Correct derivative.

(c)

M1: For correct application of Newton - Raphson (using the correct formula) with $f(2)$ and $f'(2)$ which could be implied with their values.

$x_0 = 2$ followed by $x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = \cdots$ is M1

$x = 2 - \frac{\text{their } f(2)}{\cdots} = \cdots$ is M1

A1: cso and needs to be given to 2dp. This mark can only be scored if full marks in (b) are scored (Newton Raphson used more than once – isw)