3. $$f(x) = x + \tan\left(\frac{1}{2}x\right) \qquad \pi < x < \frac{3\pi}{2}$$

Given that the equation $f(x) = 0$ has a single root α

(a) show that α lies in the interval [3.6, 3.7]

(2)

(b) Find $f'(x)$

(2)

(c) Using 3.7 as a first approximation for α, apply the Newton–Raphson method once to obtain a second approximation for α. Give your answer to 3 decimal places.

(2)