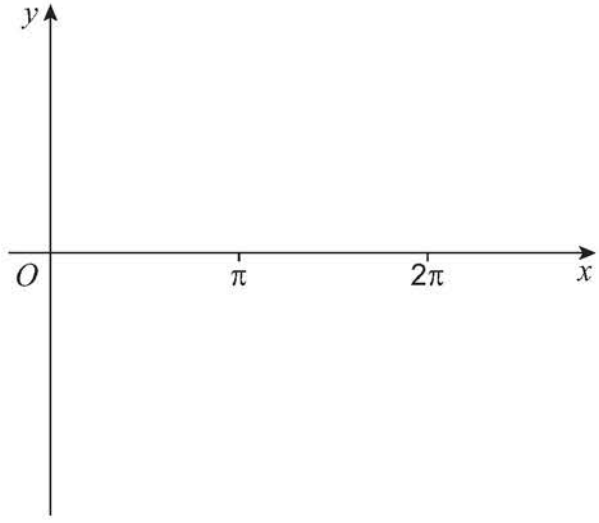


7 (a) By sketching the graphs of $y = \frac{1}{x}$ and $y = \sec 2x$ on the axes below, show that the equation

$$\frac{1}{x} = \sec 2x$$

has exactly one solution for $x > 0$

[3 marks]



7 (b) By considering a suitable change of sign, show that the solution to the equation lies between 0.4 and 0.6

[2 marks]

7 (c) Show that the equation can be rearranged to give

$$x = \frac{1}{2} \cos^{-1} x$$

[2 marks]

7 (d) (i) Use the iterative formula

$$x_{n+1} = \frac{1}{2} \cos^{-1} x_n$$

with $x_1 = 0.4$, to find x_2, x_3 and x_4 , giving your answers to four decimal places.

[2 marks]

7 (d) (ii) On the graph below, draw a cobweb or staircase diagram to show how convergence takes place, indicating the positions of x_2, x_3 and x_4 .

[2 marks]

