

Assignment 1

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Question 6 (a) :

But Given x is positive

Using properties of proportion , solve for x . Given x is positive :

$$\Rightarrow x = \frac{5}{8} \quad (12)$$

$$\frac{2x + \sqrt{4x^2 - 1}}{2x - \sqrt{4x^2 - 1}} = 4 \quad (1)$$

Verification with Graph:

If we draw the graph of $y = f(x) = \frac{2x + \sqrt{4x^2 - 1}}{2x - \sqrt{4x^2 - 1}}$ and find point of intersection with $y = 4$,
we get $x = 0.625 = \frac{5}{8}$
 $\therefore x = \frac{5}{8} = 0.625$

Solution:

From the properties of proportion

$$\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d} \quad (2)$$

The Given Equation is :

$$\frac{2x + \sqrt{4x^2 - 1}}{2x - \sqrt{4x^2 - 1}} = \frac{4}{1} \quad (3)$$

From (2)

$$\frac{2x + \sqrt{4x^2 - 1} + 2x - \sqrt{4x^2 - 1}}{2x + \sqrt{4x^2 - 1} - 2x + \sqrt{4x^2 - 1}} = \frac{4 + 1}{4 - 1} \quad (4)$$

$$\Rightarrow \frac{4x}{2\sqrt{4x^2 - 1}} = \frac{5}{3} \quad (5)$$

$$\Rightarrow \frac{6x}{5} = \sqrt{4x^2 - 1} \quad (6)$$

$$\Rightarrow \frac{36x^2}{25} = 4x^2 - 1 \quad (7)$$

$$\Rightarrow 1 = \left(4 - \frac{36}{25}\right)x^2 \quad (8)$$

$$\Rightarrow x^2 = \frac{25}{64} \quad (9)$$

$$\Rightarrow x = \pm \frac{5}{8} \quad (10)$$

$$(11)$$

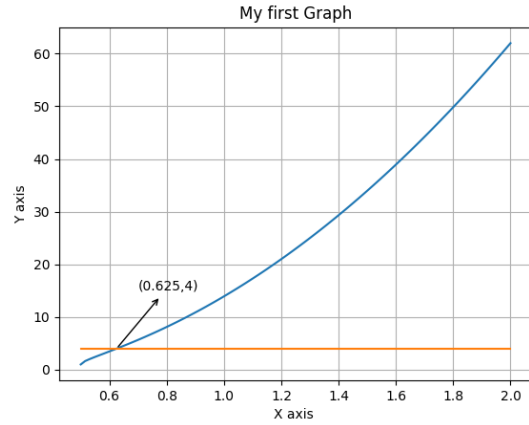


Figure 1: graph of $y = f(x)$