Assignment 1

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ICSE 2018 Question 6 (a)

(a) Using properties of proportion, solve for x. Given that x is positive:

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

Solution:

From the properties of proportion

$$\frac{a}{b}=\frac{c}{d}\Rightarrow\frac{a+b}{a-b}=\frac{c+d}{c-d} \qquad -(1)$$

The Given Equation is :

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

From (1)

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

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

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

$$\Rightarrow\frac{36x^2}{25}=4x^2-1$$

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

$$\Rightarrow x^2=\frac{25}{64}$$

$$\Rightarrow x=\pm\frac{5}{8}$$

But Given x is positive

$$\Rightarrow x=\frac{5}{8}$$

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 = $\frac{5}{8}$

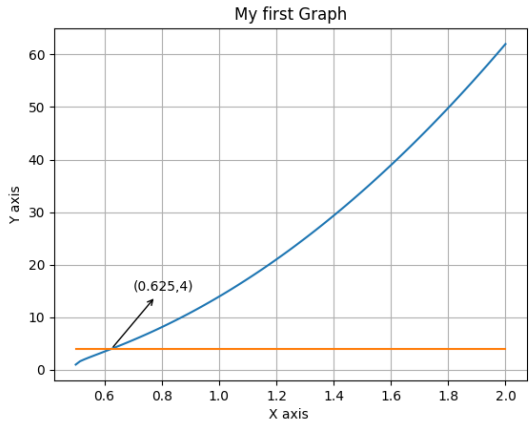

Figure 1: graph of y = f(x)

$$\therefore x=\frac{5}{8}=0.625$$