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Where Minds Pollinate

Class 12
Mathematics

Chapter 1
Review Exercise 1
Handwritten Solution

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Ch#1 Review Exercise

Qno2. a) $f(x) = 4 + \sqrt{x+2}$

Domain: $[-2, +\infty)$ Range: $[4, +\infty)$

b) $f(x) = x - \sqrt{2x-3}$

Domain: $[\frac{3}{2}, +\infty)$ Range: $[0, \infty)$

c) $f(x) = \frac{x}{x-2}$

Domain: $\mathbb{R} - [2]$

Range: $y = \frac{x}{x-2} \Rightarrow xy - 2y = x$
 $x = \frac{2y}{y-1}$

$\mathbb{R} - [1]$

d) $f(x) = \sqrt{x^2 - 5x + 4}$

Domain: $\sqrt{(x-1)(x-4)}$

$x=1 \quad x=4$

$(-\infty, 1] \cup [4, +\infty)$

Range: $[0, \infty)$

Q3) a) $f(x) = 1 + x^2$

Domain: $\mathbb{R}$ Range: $[1, \infty)$

b) $f(x) = (2x+1)^2$

Domain: $\mathbb{R}$ Range: $[0, \infty)$

c) $f(x) = 9 - \sqrt{x}$

Domain: $[0, \infty)$

Range: $[-\infty, 9]$

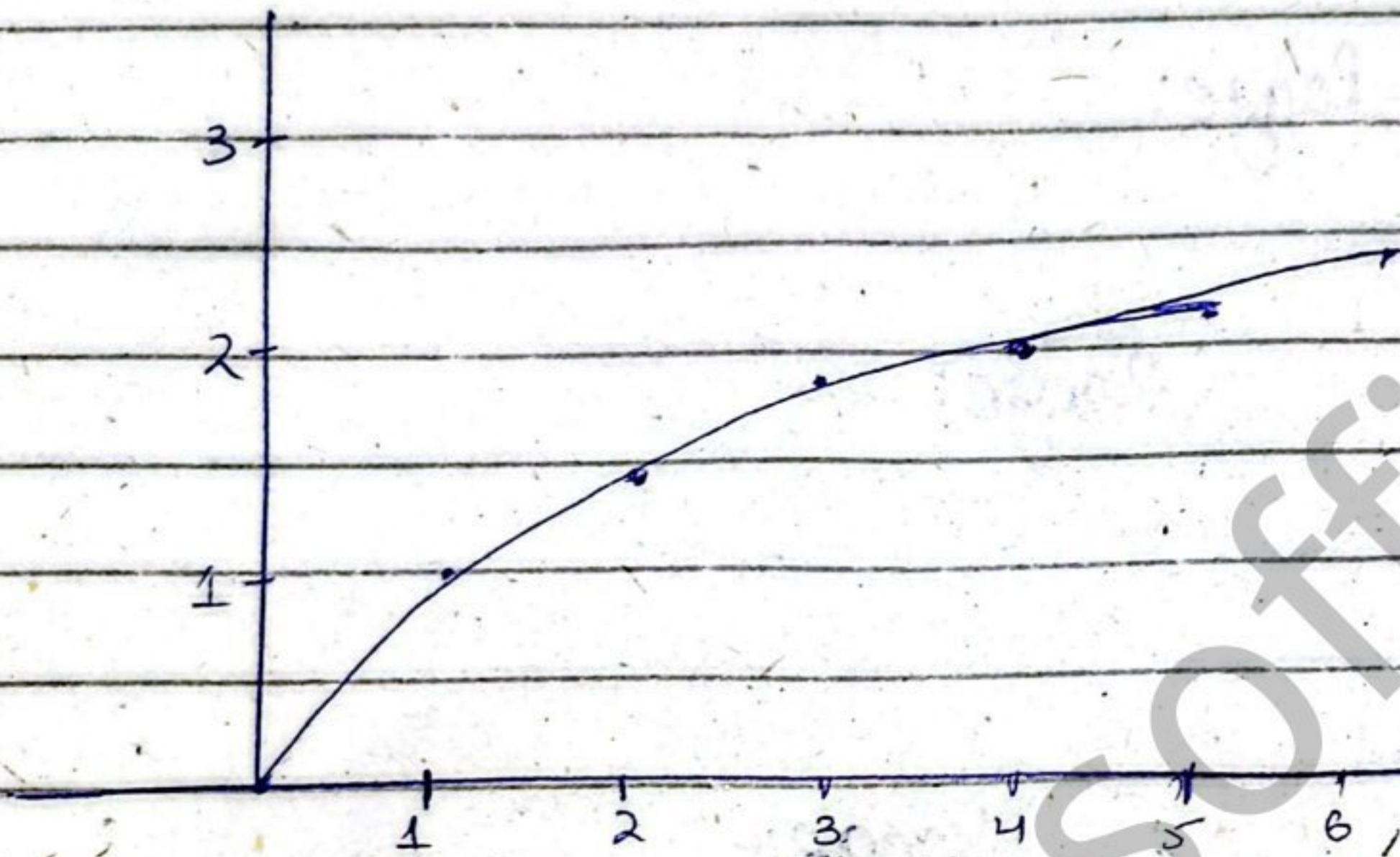
d) $f(x) = 3 + \sqrt{4-x^2}$

Domain: $[-2, 2]$

Range: $[3, 5]$

Q4. $y = \sqrt{x}$

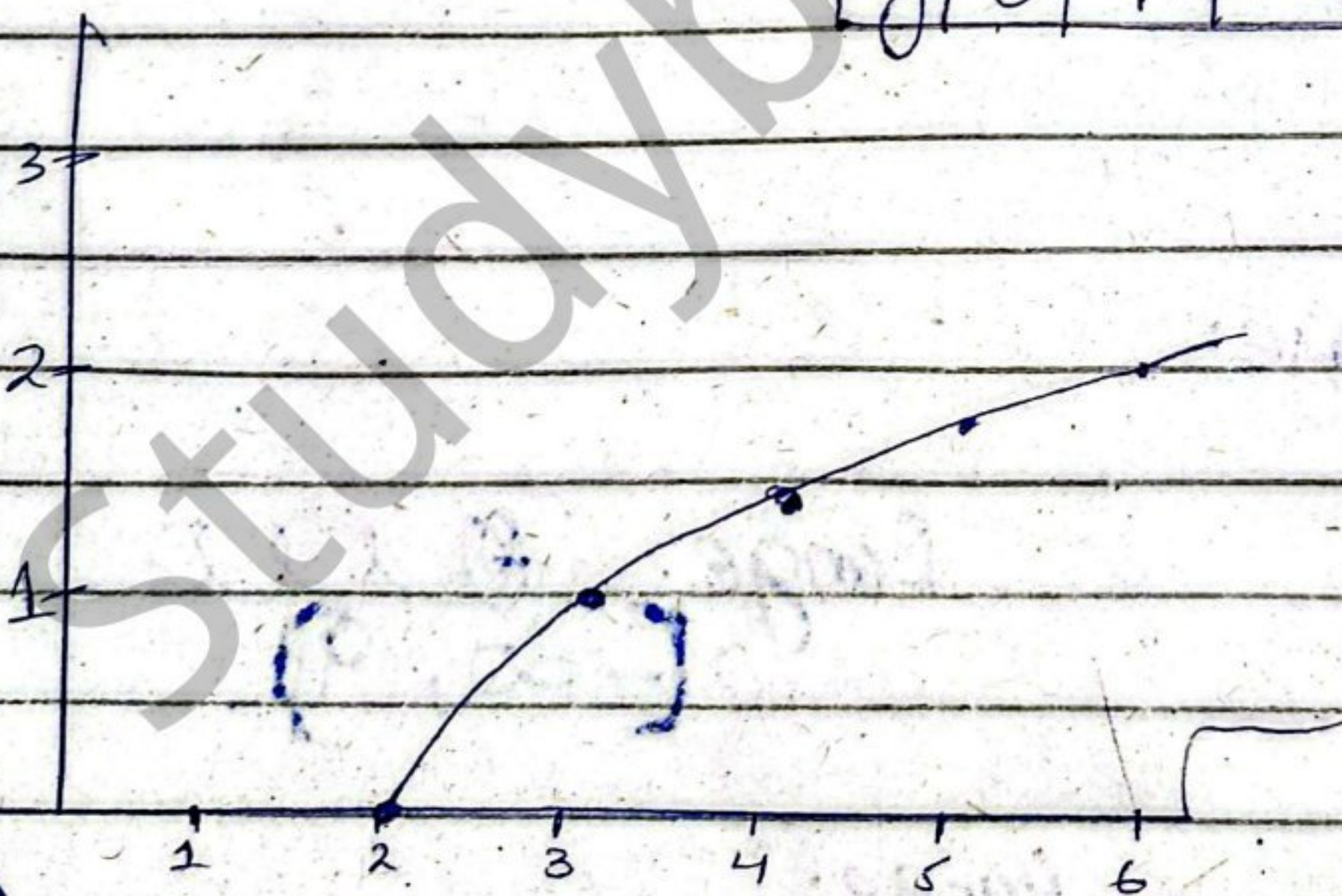
x	0	1	2	3	4	5	6
y	0	1	1.4	1.7	2	2.2	2.4



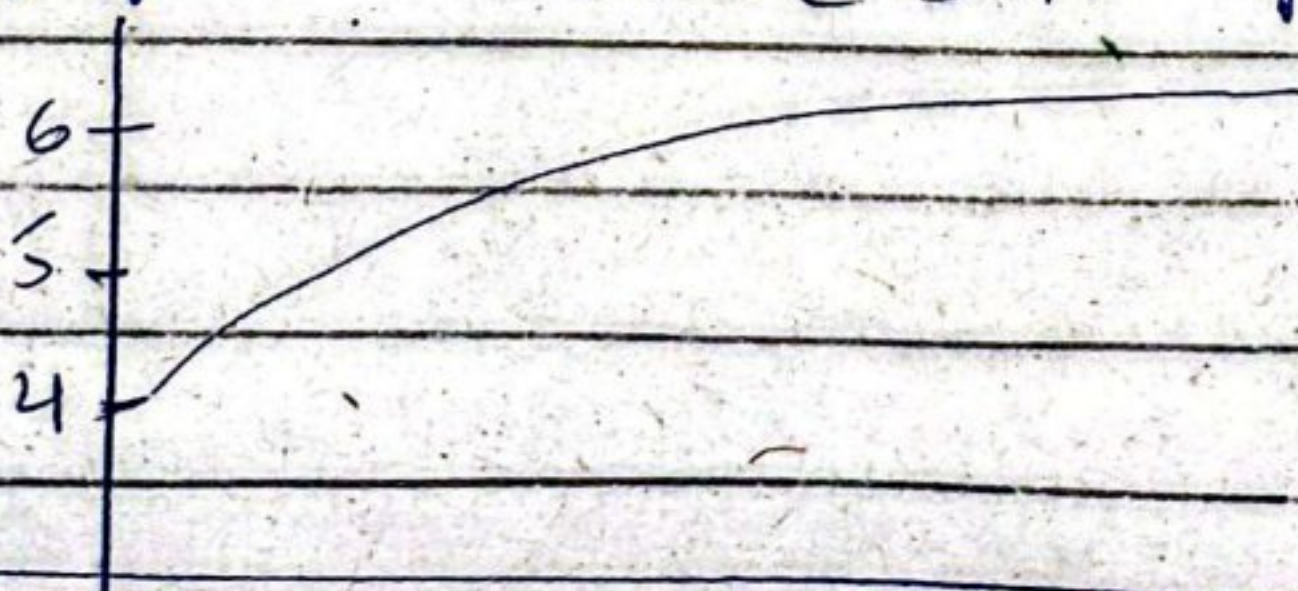
(a) $y = \sqrt{x-2}$. Horizontal shift right by 2 units.

Dom = $[2, +\infty)$

x	2	3	4	5	6
y	0	1	1.4	1.7	2

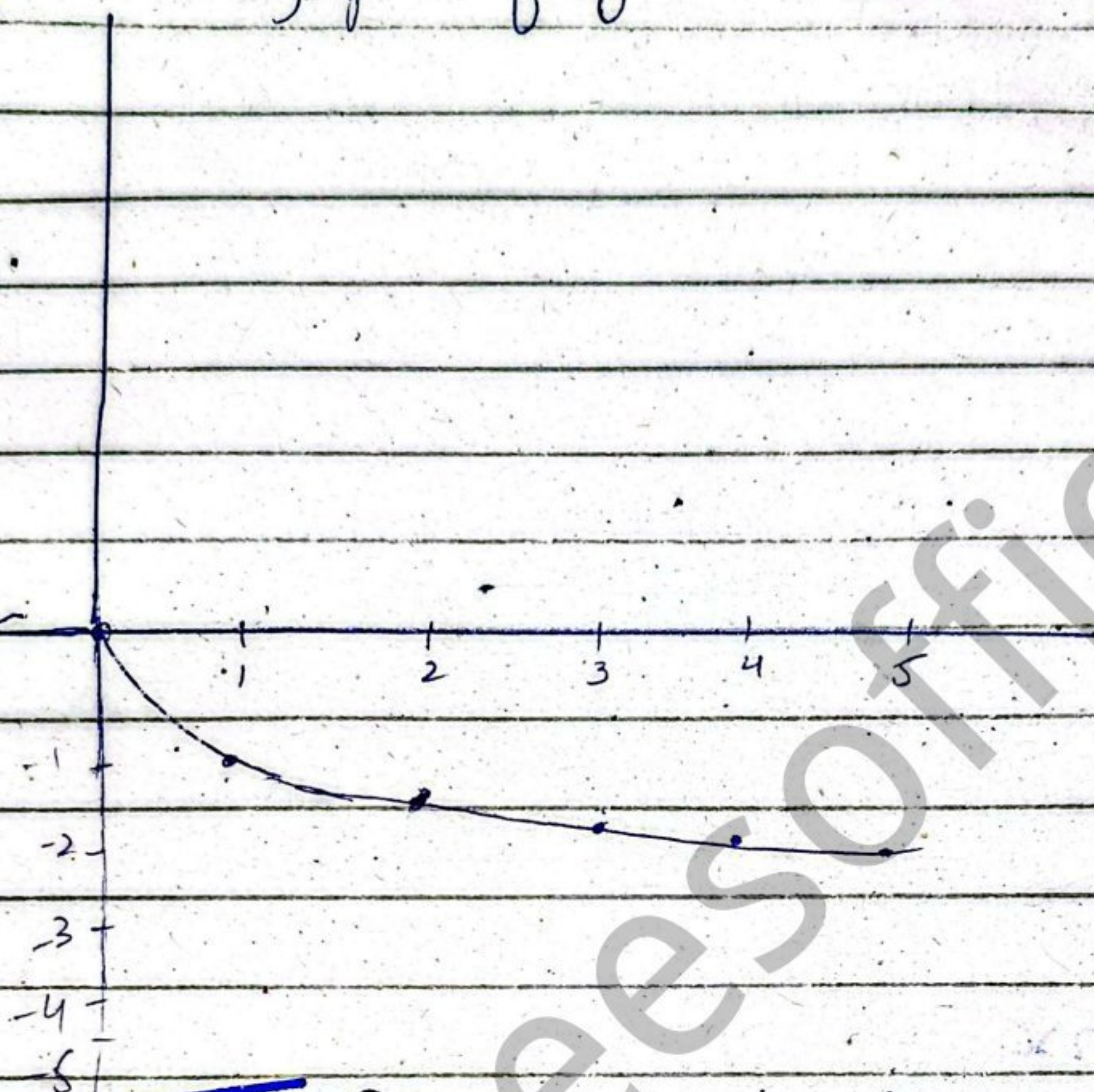


(b) $y = \sqrt{x} + 4$ vertical shift upward 4 units



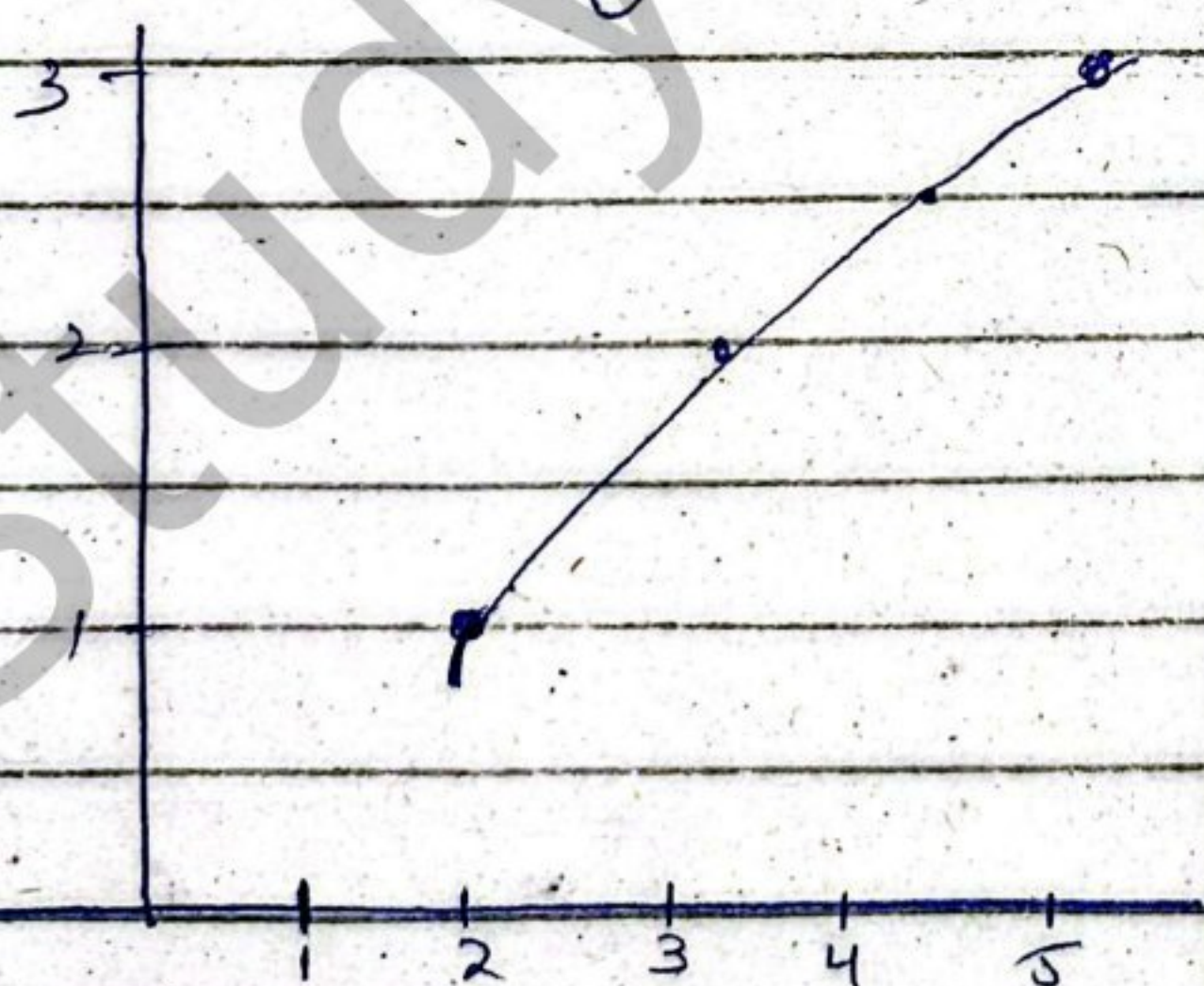
© $y = -\sqrt{x}$

The graph of $y = -\sqrt{x}$ is flipped



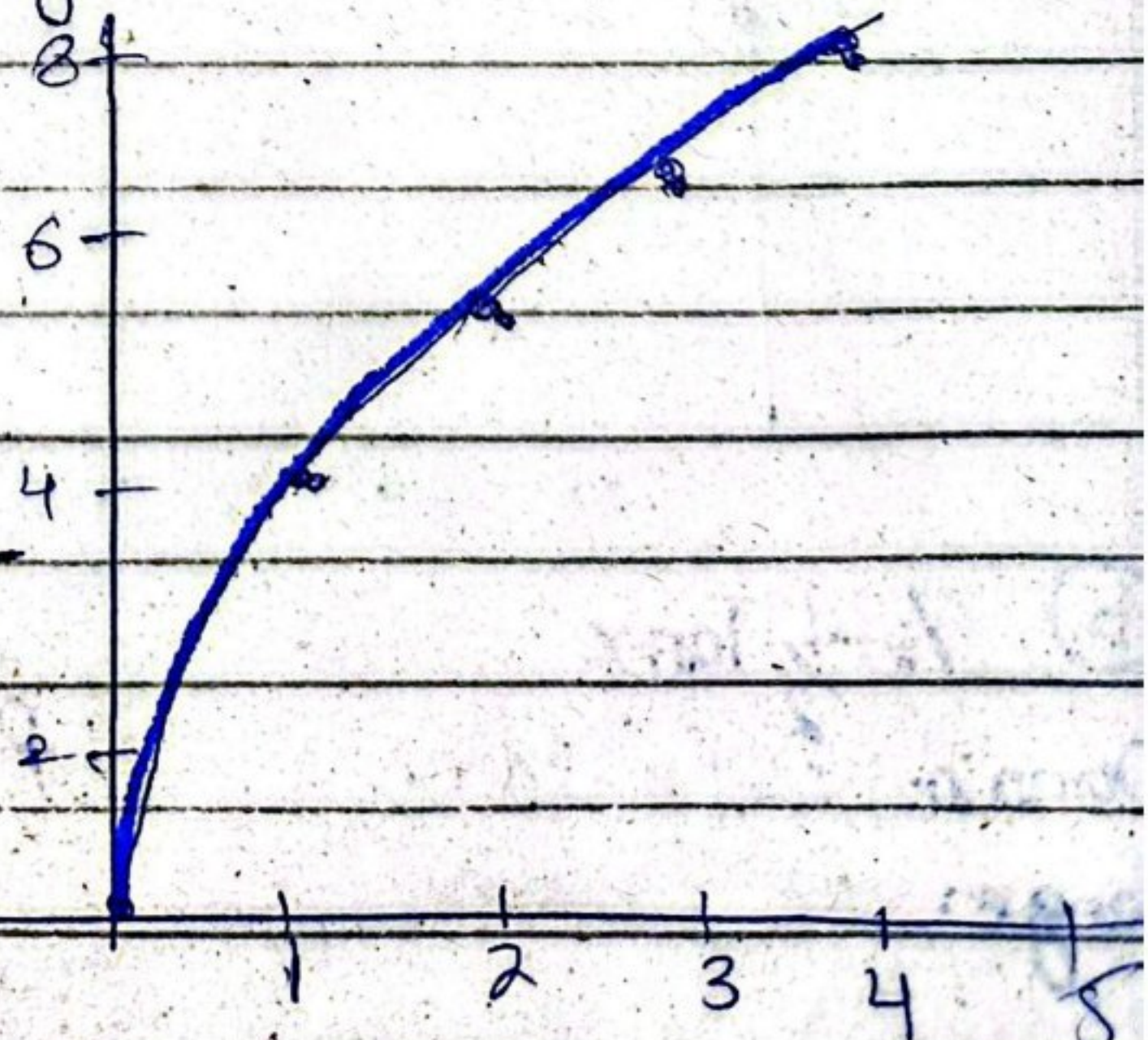
© $y = 1 + \sqrt{x-2}$

Graph is horizontally shifted right by 2 units and vertically upward by 1-unit.

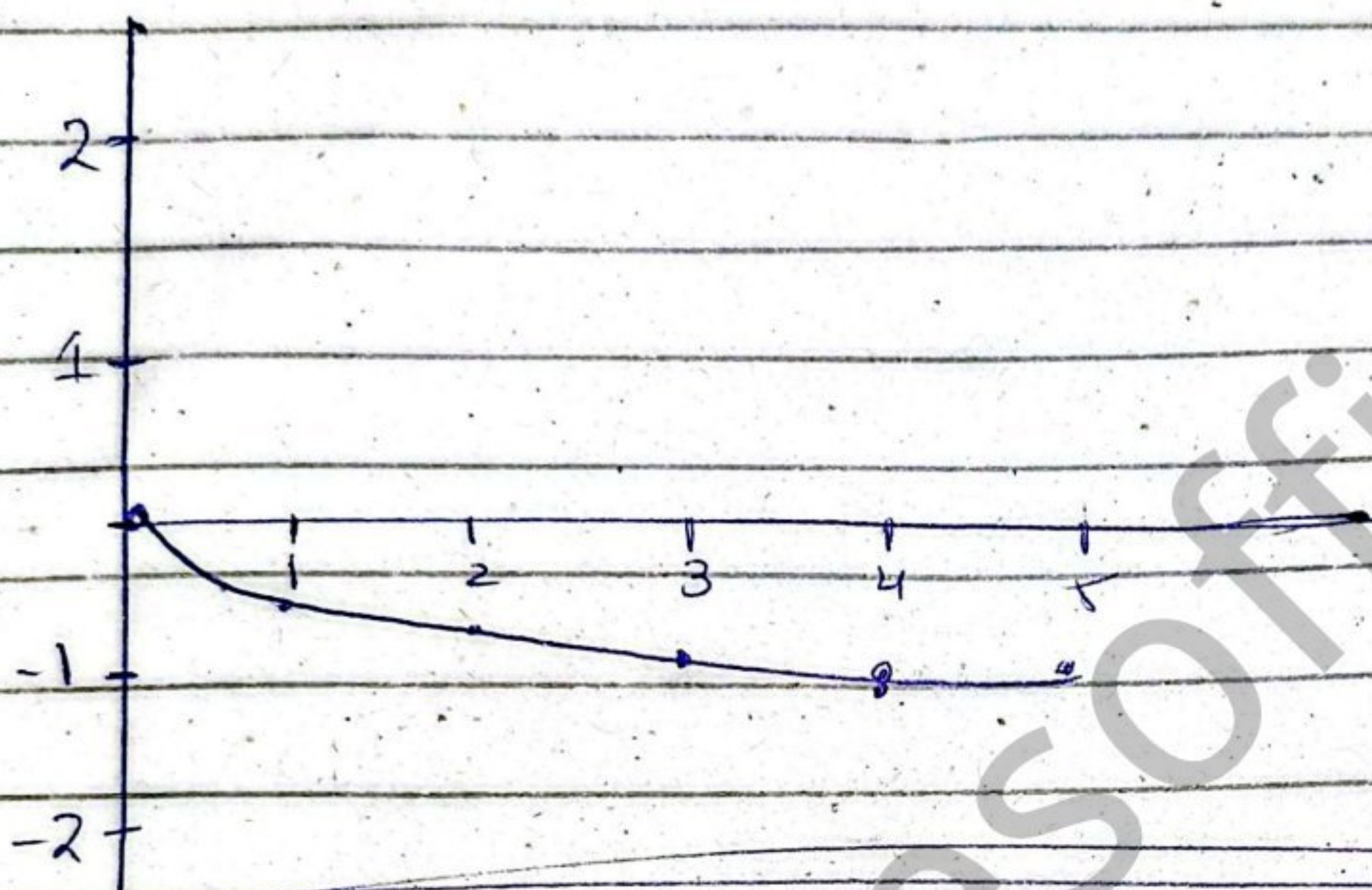


© $4\sqrt{x}$

The graph is compressed by changing y-value by 4 in same direction.



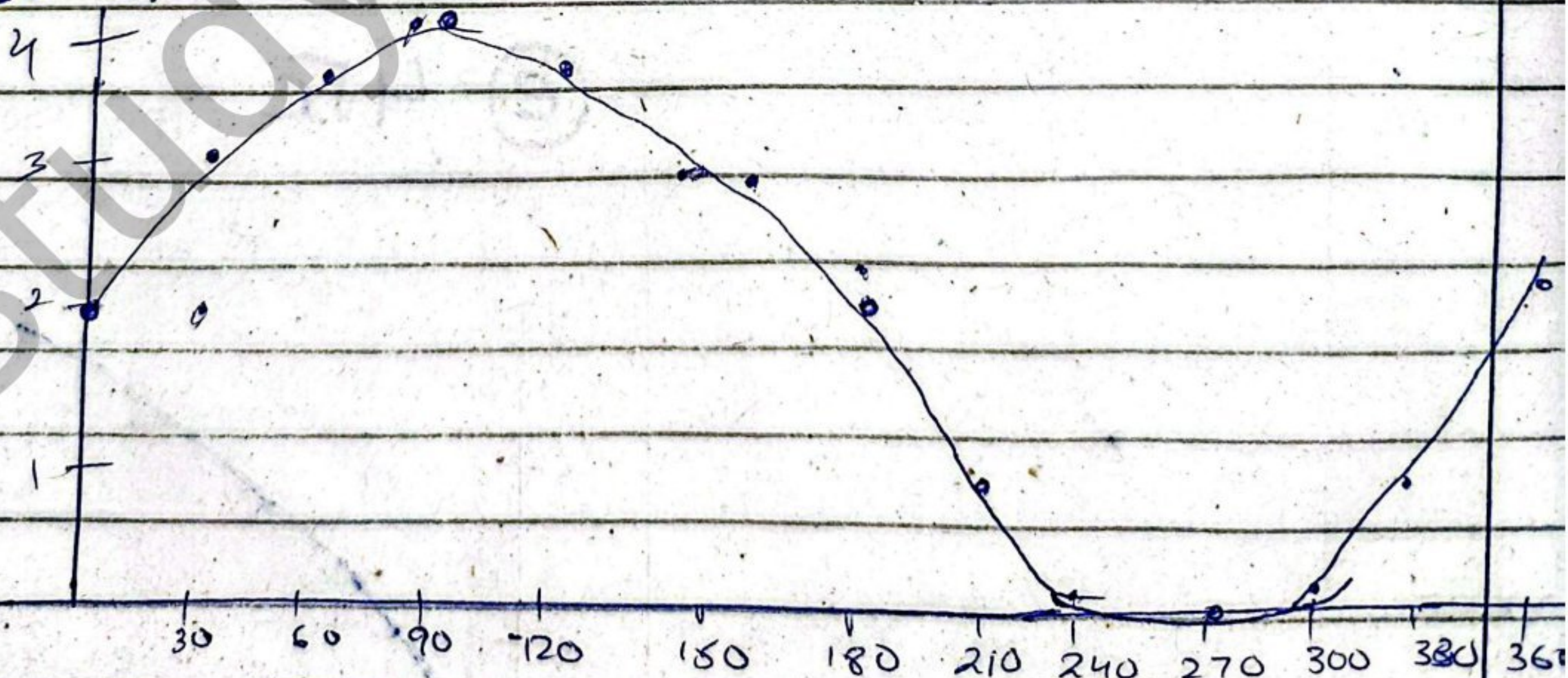
④ $y = -\frac{1}{3}\sqrt{x}$ The graph is stretched by changing y values by 3 in opposite direction.



Q5) a) $y = 2 + 2\sin x$

Domain: $\mathbb{R}$ Range: $[-2, 2]$ Two unit upward.

Period: 2π

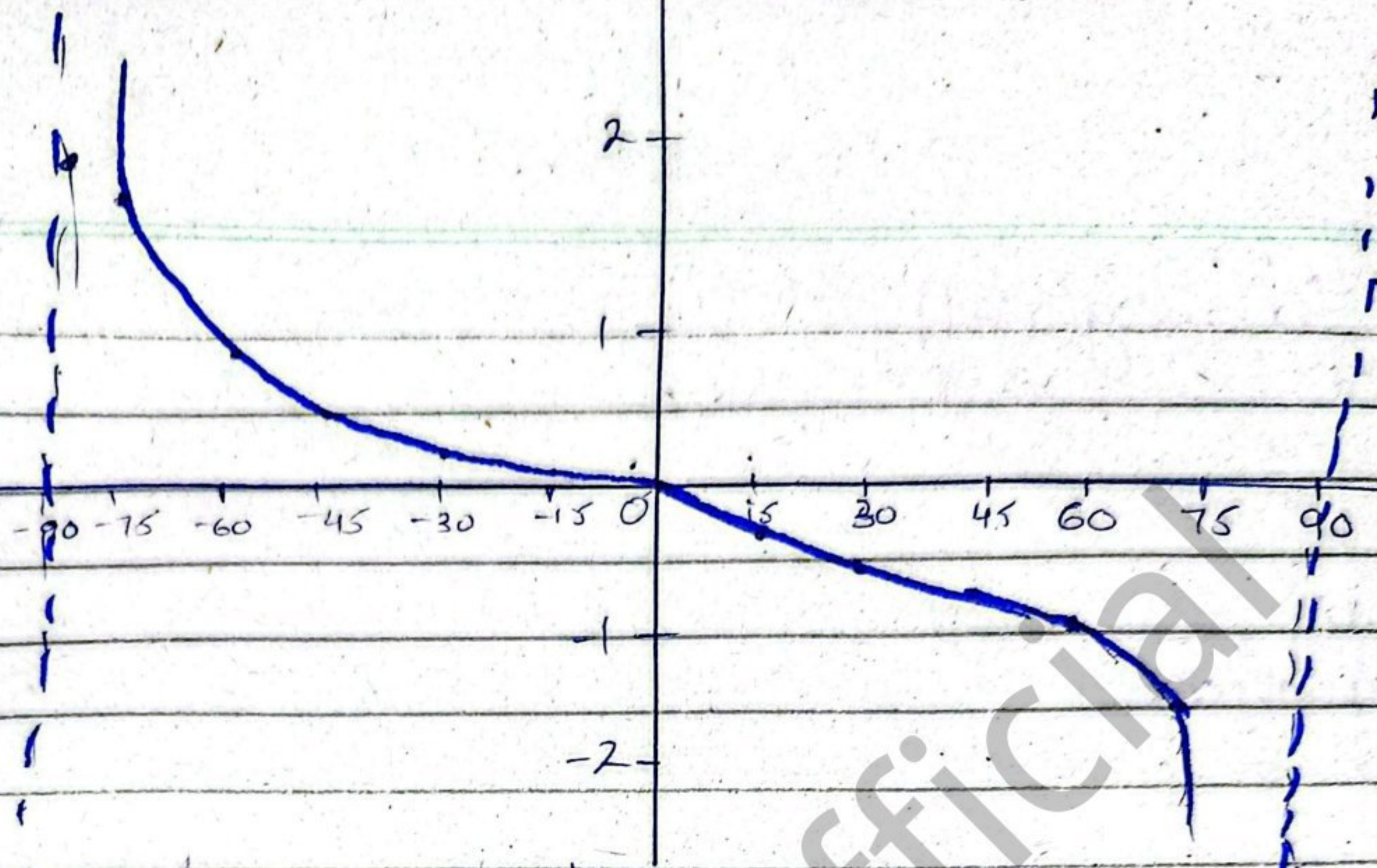


⑥ $y = -\frac{1}{2}\tan x$

Domain: $\mathbb{R} - \{x = (n+1)\pi\}$

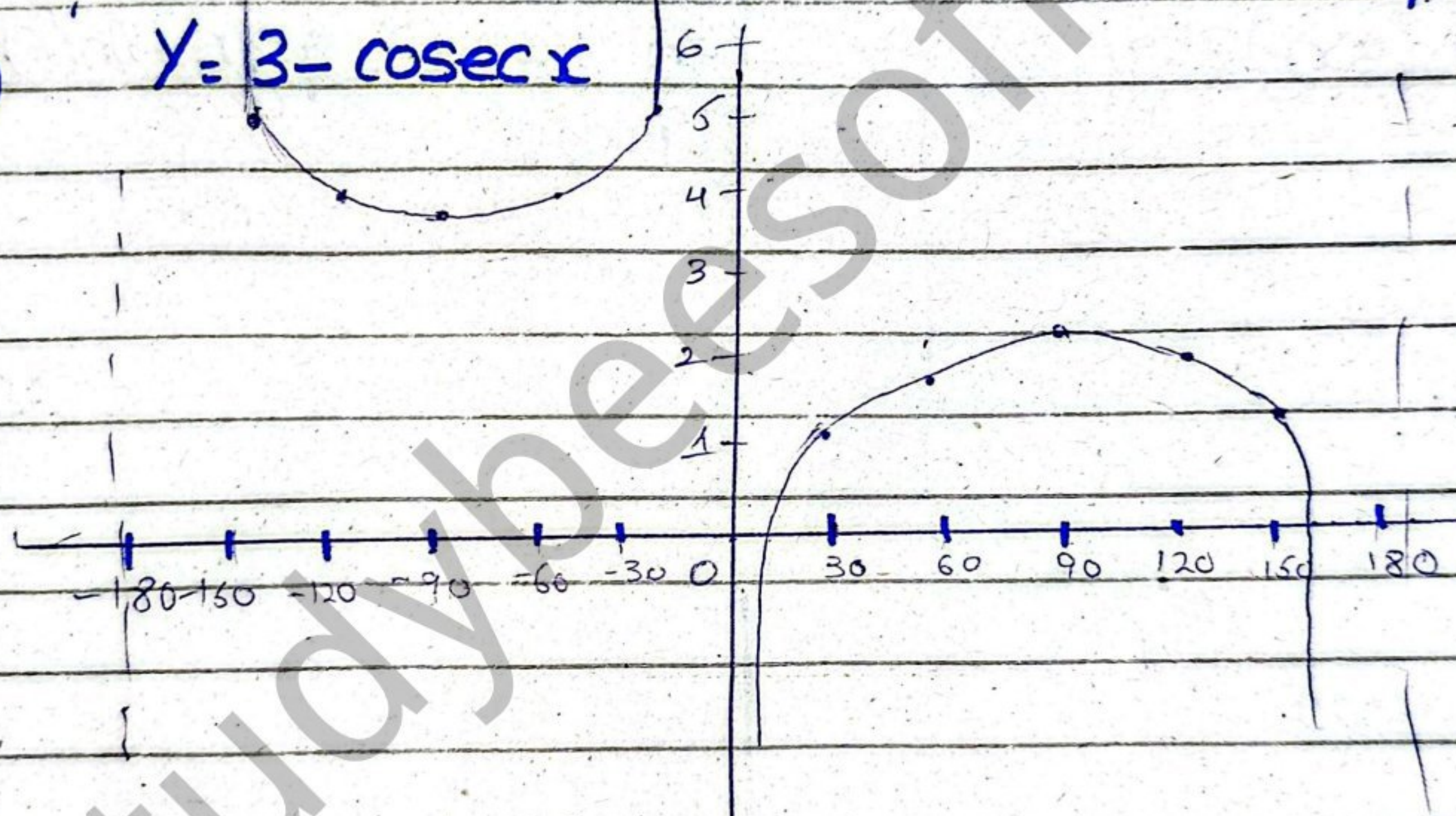
Range: $\mathbb{R}$

Period: π



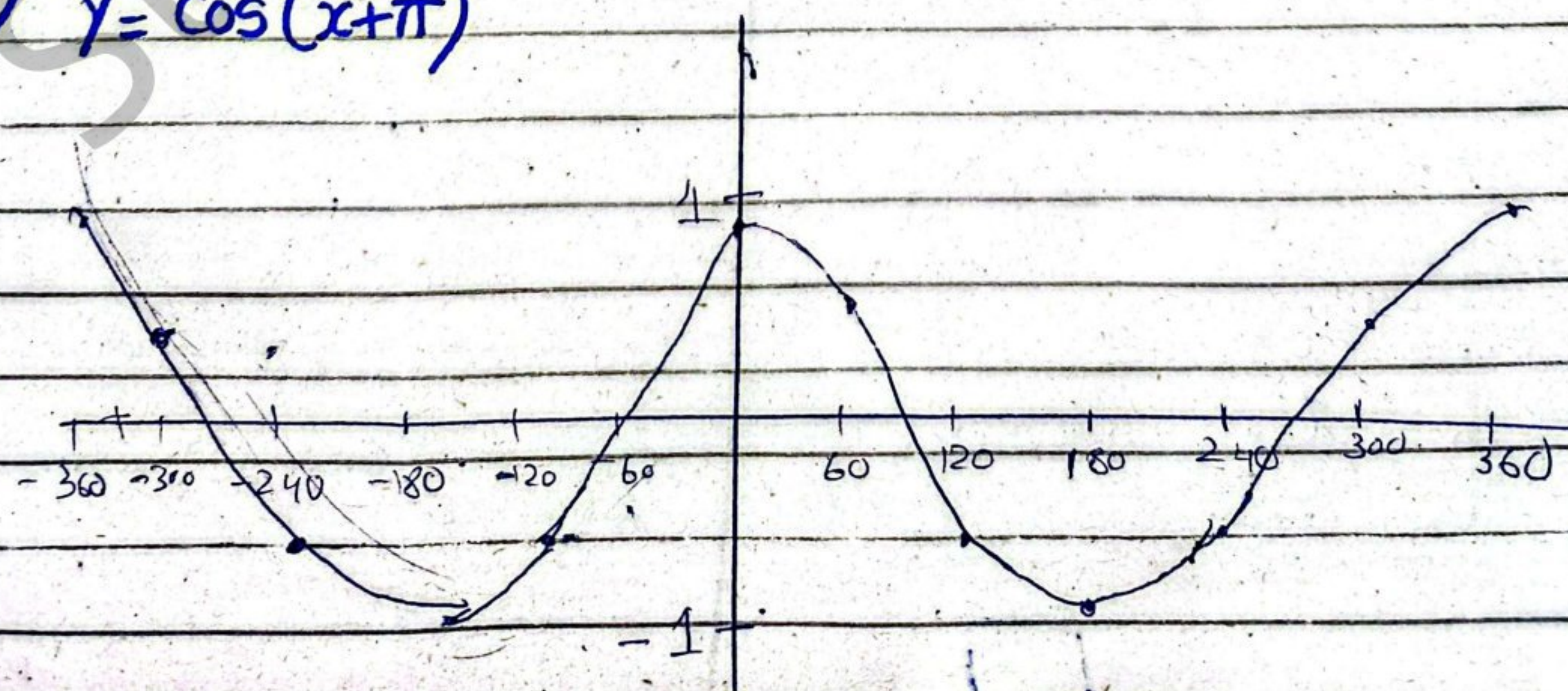
©

$$y = 3 - \operatorname{cosec} x$$



d

$$y = \cos(x + \pi)$$



Q6 $f(x) = \log(x^2+1)$

Domain $f(x) = x^2+1 > 0$

$x^2 > 0$

$x^2 > 0$

$x^2+1 > 0+1$

$x^2+1 \geq 1$

Domain: $\mathbb{R}$

x^2+1 is always +ve

Range $= [0, \infty)$

Important note: $f(x) = \log(x^2+1)$ is not one to one on all $\mathbb{R}$ so its inverse exist only restricted domain

Q7) $f(g(x)) = g(f(x)) = x$ when $f(x) = e^x$ & $g(x) = \ln(x)$

$f(g(x))$

$f(x) = e^x$

$f(g(x)) = e^{g(x)}$

$f(g(x)) = e^{\ln(x)} = x$

$f(g(x)) = x$

$g(f(x))$

$g(x) = \ln(x)$

$g(f(x)) = \ln(f(x))$

$g(f(x)) = \ln(e^x)$

$g(f(x)) = x$

Q8) $P(t) = 1000 e^{(0.05t)}$

if $P(t) = 5000$

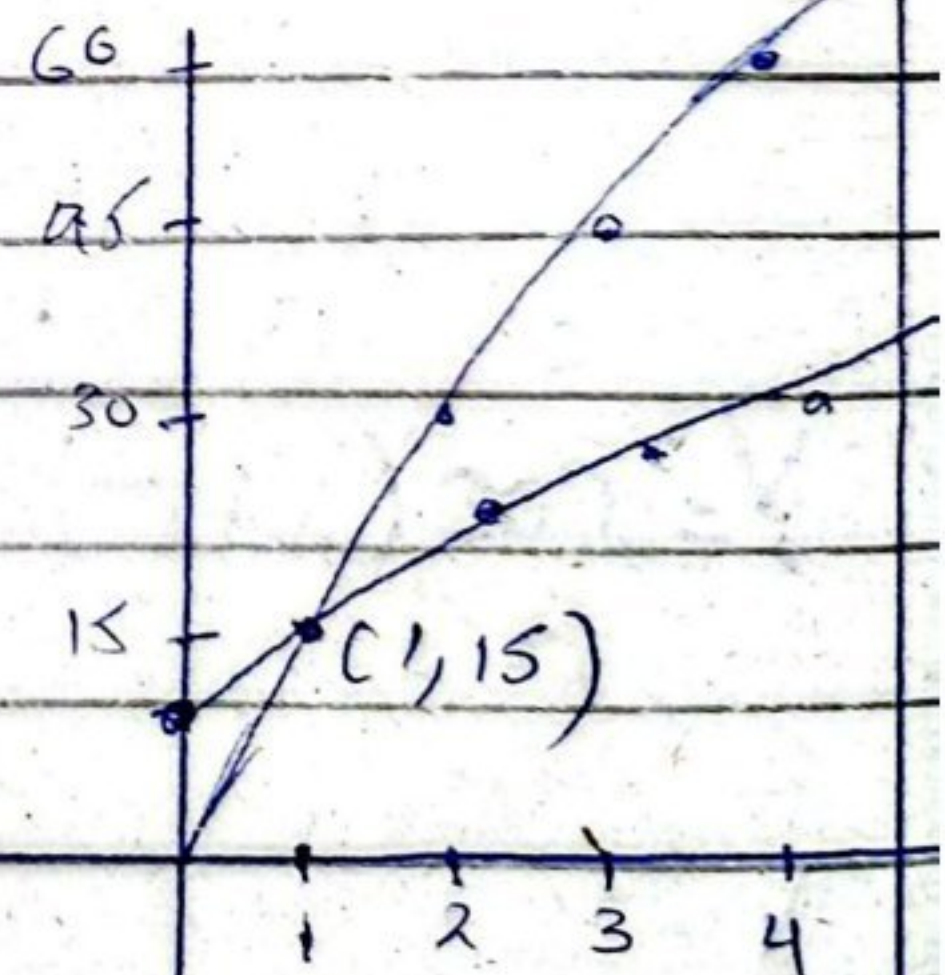
$t = ?$

$5000 = 1000 e^{0.05t}$

$5 = e^{0.05t}$

$\ln 5 = 0.05t \ln e$

$t = \frac{\ln 5}{0.05} \Rightarrow 32 \text{ years}$



Q9) for equilibrium point $(x) = P(x)$

$5x+10 = 15x$

$x = 1$ $y = 15$

$P(x) = 15x$ $y = 15(1)$