

## Exercise 2.2

1. Which of the following are algebraic, exponential, logarithmic, trigonometric, inverse trigonometric, hyperbolic and inverse hyperbolic functions.

algebraic	(i) $y = x^2 + 5x + 6$	(ii) $f(x) = \tan^{-1}x$ inverse trigonometric.
exponential	(iii) $y = 2^{x+1}$	(iv) $y = \log_5(x+2)$ logarithmic
trigonometric	(v) $f(x) = 3\sin x$	(vi) $y = a^{\sin x}$ exponential.
algebraic	(vii) $f(x) = \frac{x^2 + 5x + 7}{x + 9}$	(viii) $f(x) = \frac{\sin x}{\sec x}$ trigonometric.
logarithmic	(ix) $y = \log_a \sin x$	(x) $f(x) = \operatorname{cosec}^{-1}\sqrt{x^2 - 1}$ inverse trigonometric
trigonometric	(xi) $f(x) = \tan(\sin x)$	(xii) $y = \frac{x}{x+3}$ algebraic.
hyperbolic	(xiii) $f(x) = \sinh x$	(xiv) $y = \ln \cosh x$ logarithmic
inverse hyperbolic.	(xv) $y = \tan h^{-1}x$	(xvi) $y = \cos^{-1}(\ln x)$ inverse trigonometric.

2. Identify, whether the  $y$  is the explicit or implicit function of independent variable  $x$  if:

(i) $xy^2 + 5xy + 7 = 0$	(ii) $y = 3x^2 - 3x + 5$
(iii) $yx^2 + y^2x = 3 - 5y$	(iv) $x^2 + xy^2 = 2 + 3xy$
(v) $y = \frac{x+3}{x^2+5}$	(vi) $\frac{x}{y} = 3x^3y - 5$

(i) $xy^2 + 5xy + 7 = 0$	implicit.
(ii) $y = 3x^2 - 3x + 5$	explicit
(iii) $yx^2 + y^2x = 3 - 5y$	implicit
(iv) $x^2 + xy^2 = 2 + 3xy$	implicit
(v) $y = \frac{x+3}{x^2+5}$	explicit
(vi) $\frac{x}{y} = 3x^3y - 5$	
$x = 3x^3y^2 - 5y$	implicit.

3. Draw the graph of the following functions:

(i)  $f(x) = e^{3x}$

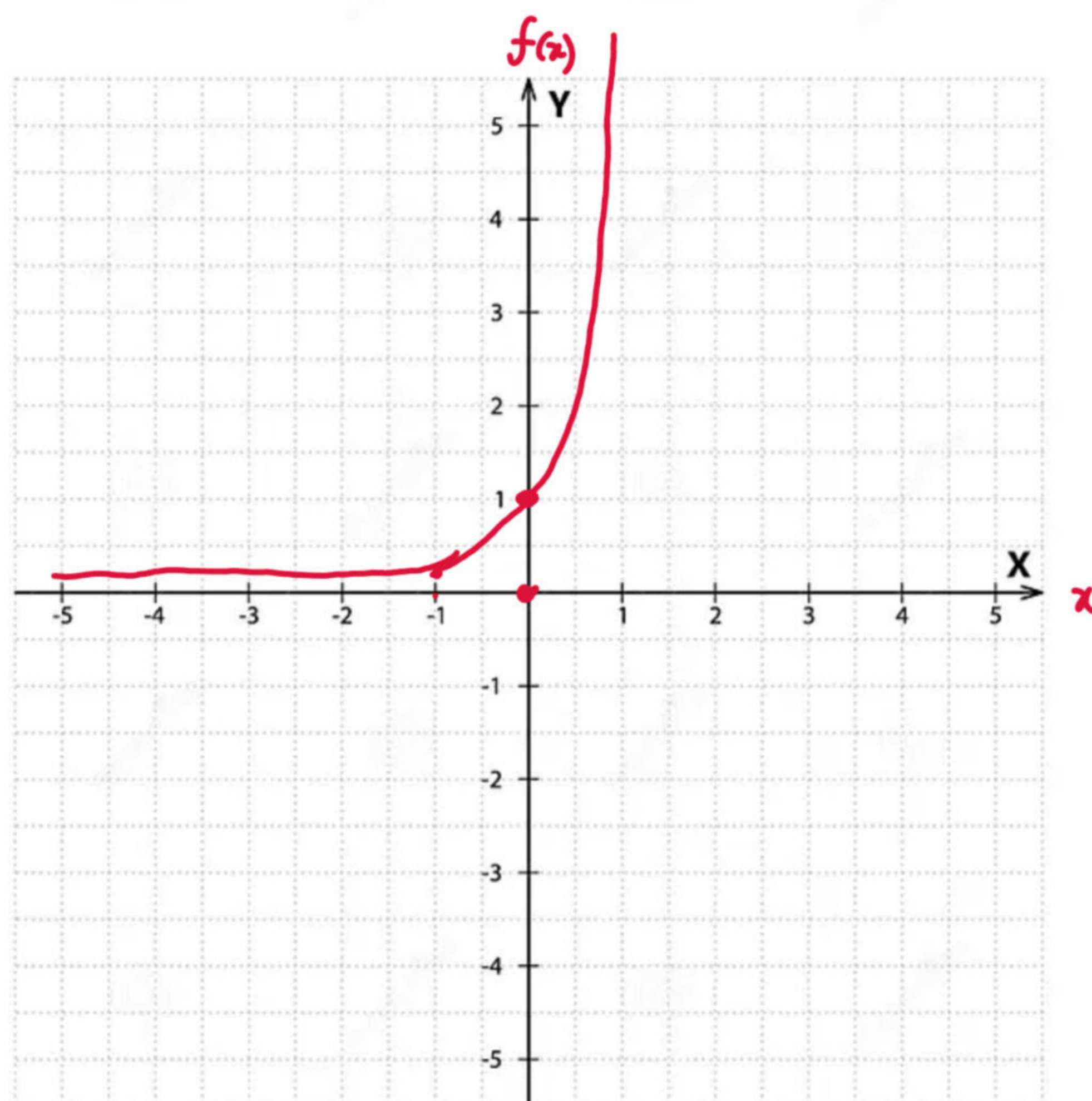
(ii)  $f(x) = 3\log_{10}x$

(iii)  $y = \sqrt{36 - x^2}$

(iv)  $\frac{x^2}{16} + \frac{y^2}{25} = 1$

(i)  $f(x) = e^{3x}$

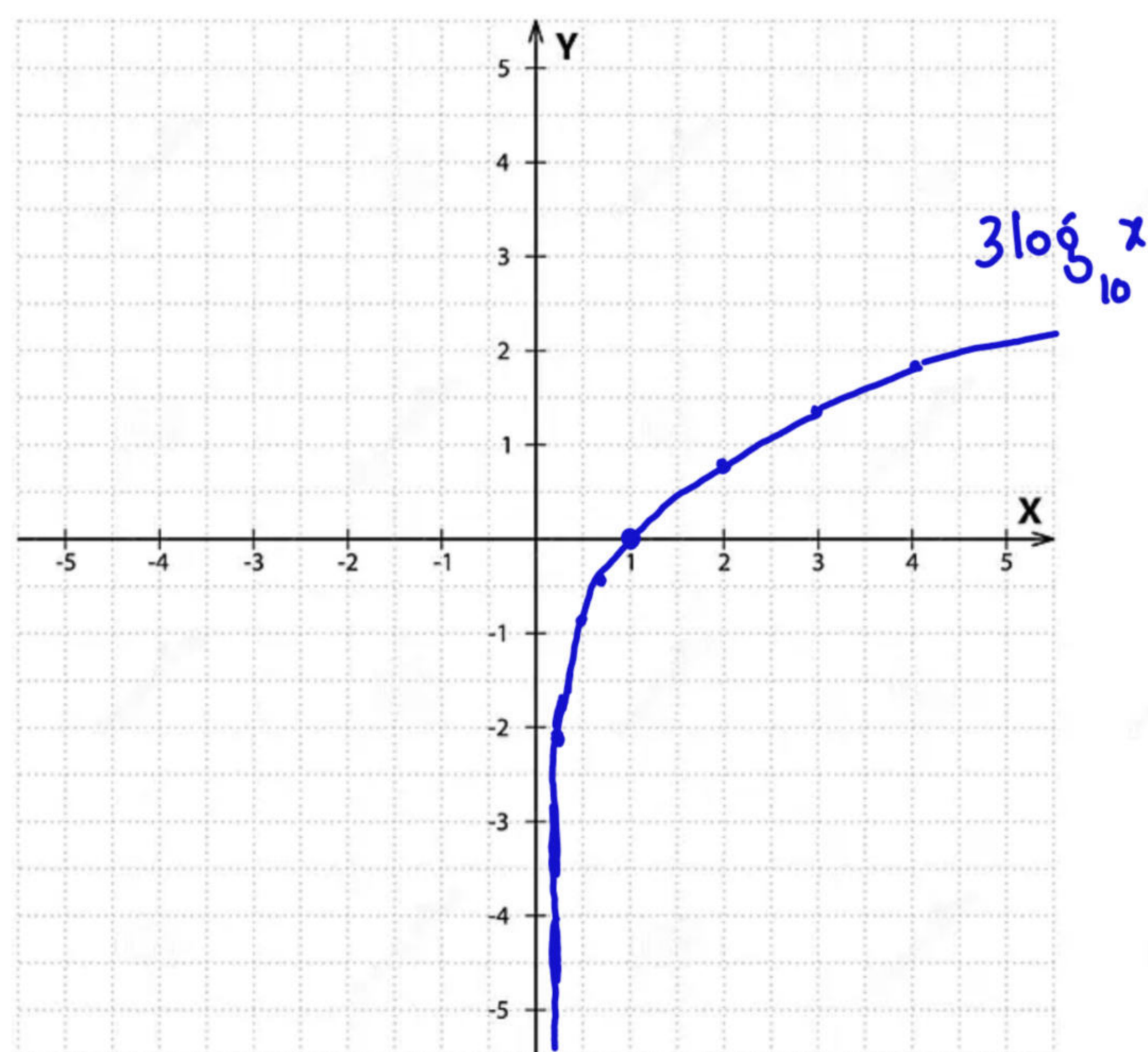
x	-4	-3	-2	-1	0	1	2	3	4
f(x)				0.0498	1	20.08	403.43		



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(ii)  $f(x) = 3\log_{10}x$

x	0	0.2	0.5	0.7	0.9	1	2	3	4
f(x)	X	-2.1	-0.9	-0.46	-0.137	0	0.9	1.43	1.8

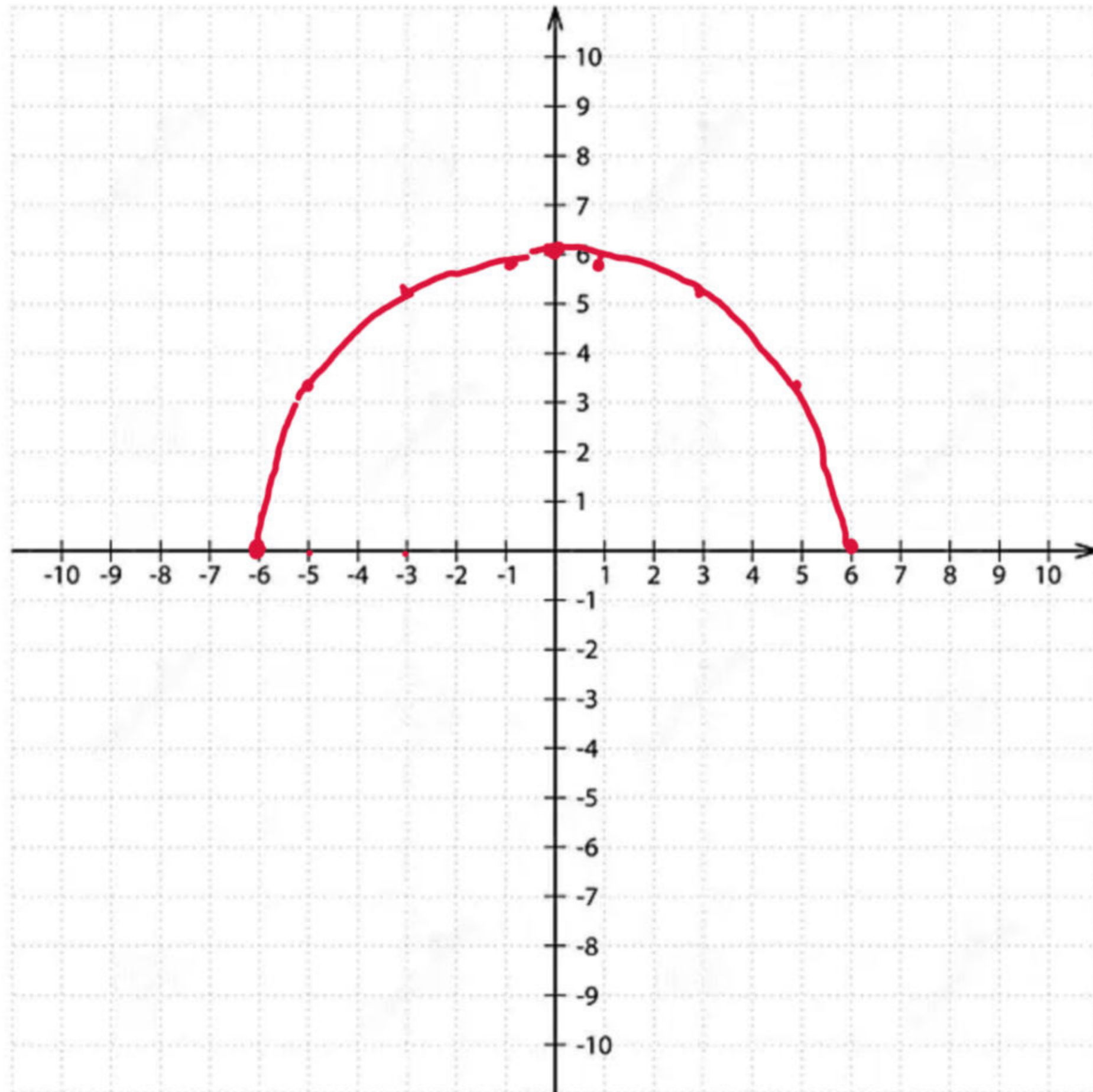


(iii)

$$y = \sqrt{36 - x^2}$$

$$36 - x^2 = 0 \\ x = \pm 6.$$

x	-6	-5	-3	-1	0	1	3	5	6
y	0	3.31	5.2	5.9	6	5.9	5.2	3.31	0



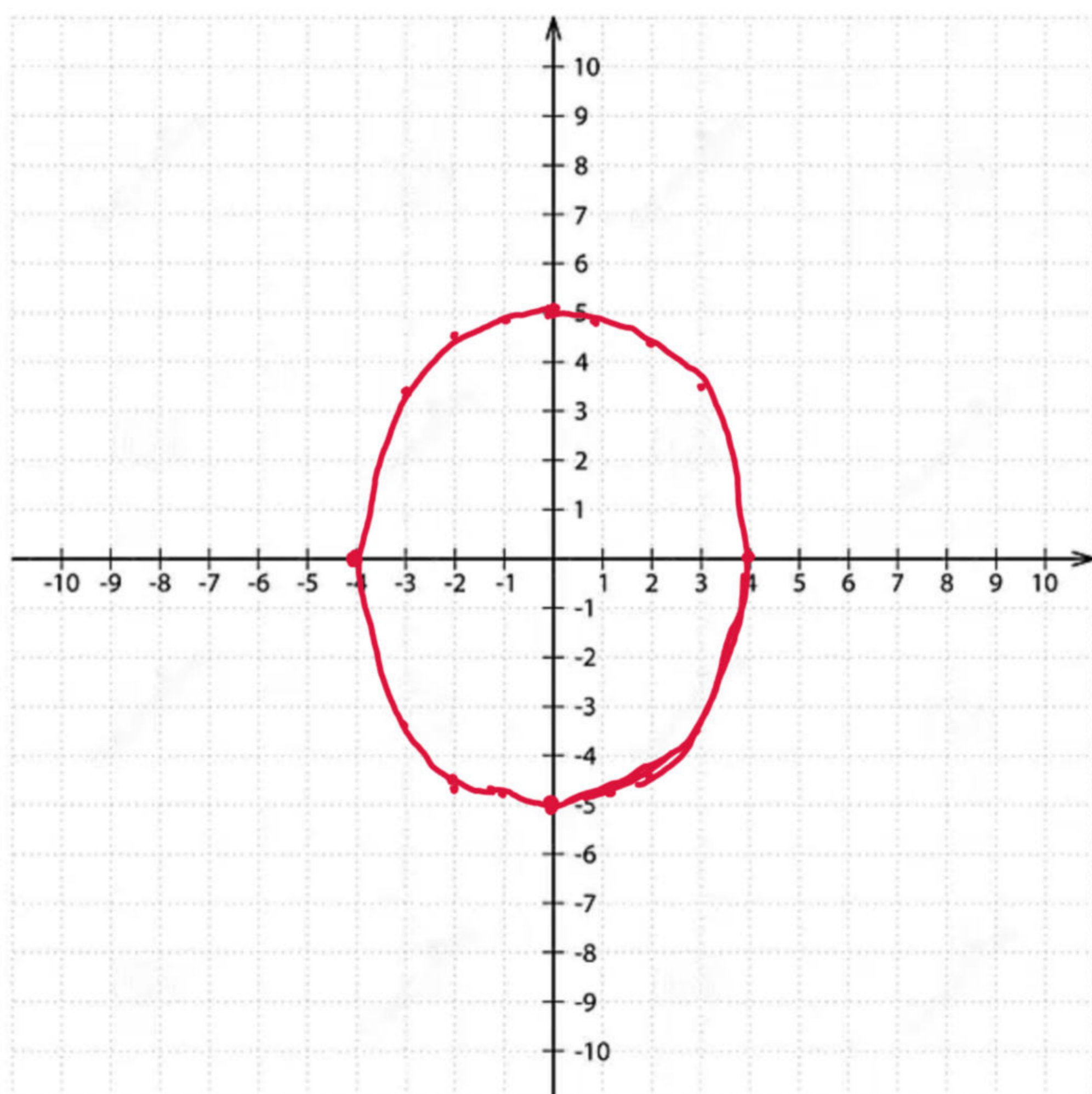
$$y^2 = \frac{25}{16}(16 - x^2)$$

$$y = \pm \frac{5}{4} \sqrt{16 - x^2}$$

(iv)

$$\frac{x^2}{16} + \frac{y^2}{25} = 1 \Rightarrow \frac{y^2}{25} = 1 - \frac{x^2}{16} = \frac{16 - x^2}{16}$$

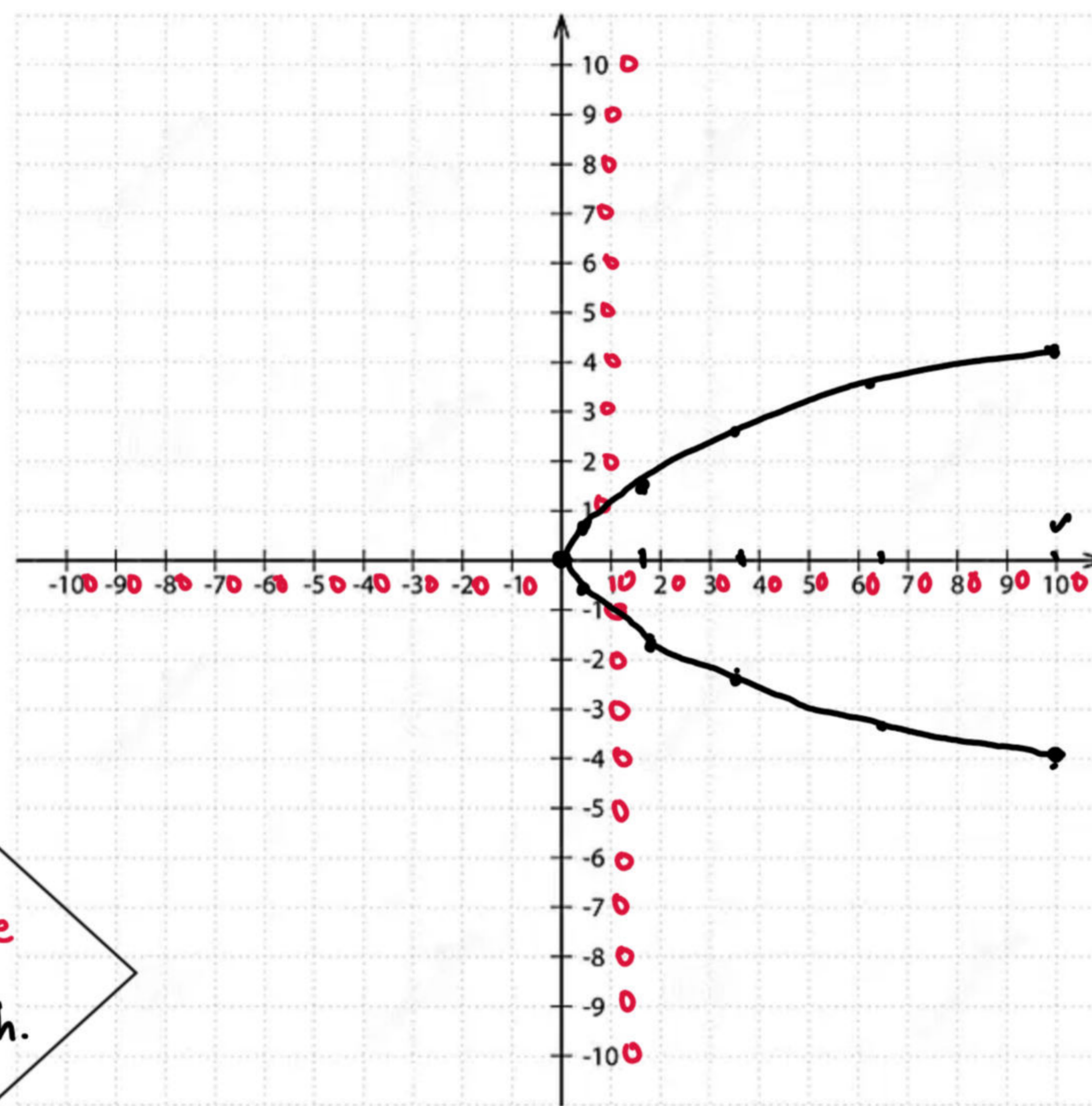
x	-4	-3	-2	-1	0	1	2	3	4
y	±0	±3.3	±4.33	±4.8	±5	±4.8	±4.33	±3.3	±0



4. Draw the graph of parametric equations of function  
 $x = at^2$ ,  $y = 2at$ , when  $a = 4$  and  $-5 \leq t \leq 5$

$$x = 4t^2, \quad y = 8t \quad -5 \leq t \leq 5$$

$t$	-5	-4	-3	-2	-1	0	1	2	3	4	5
$x$	100	64	36	16	4	0	4	16	36	64	100
$y$	-40	-32	-24	-16	-8	0	8	16	24	32	40



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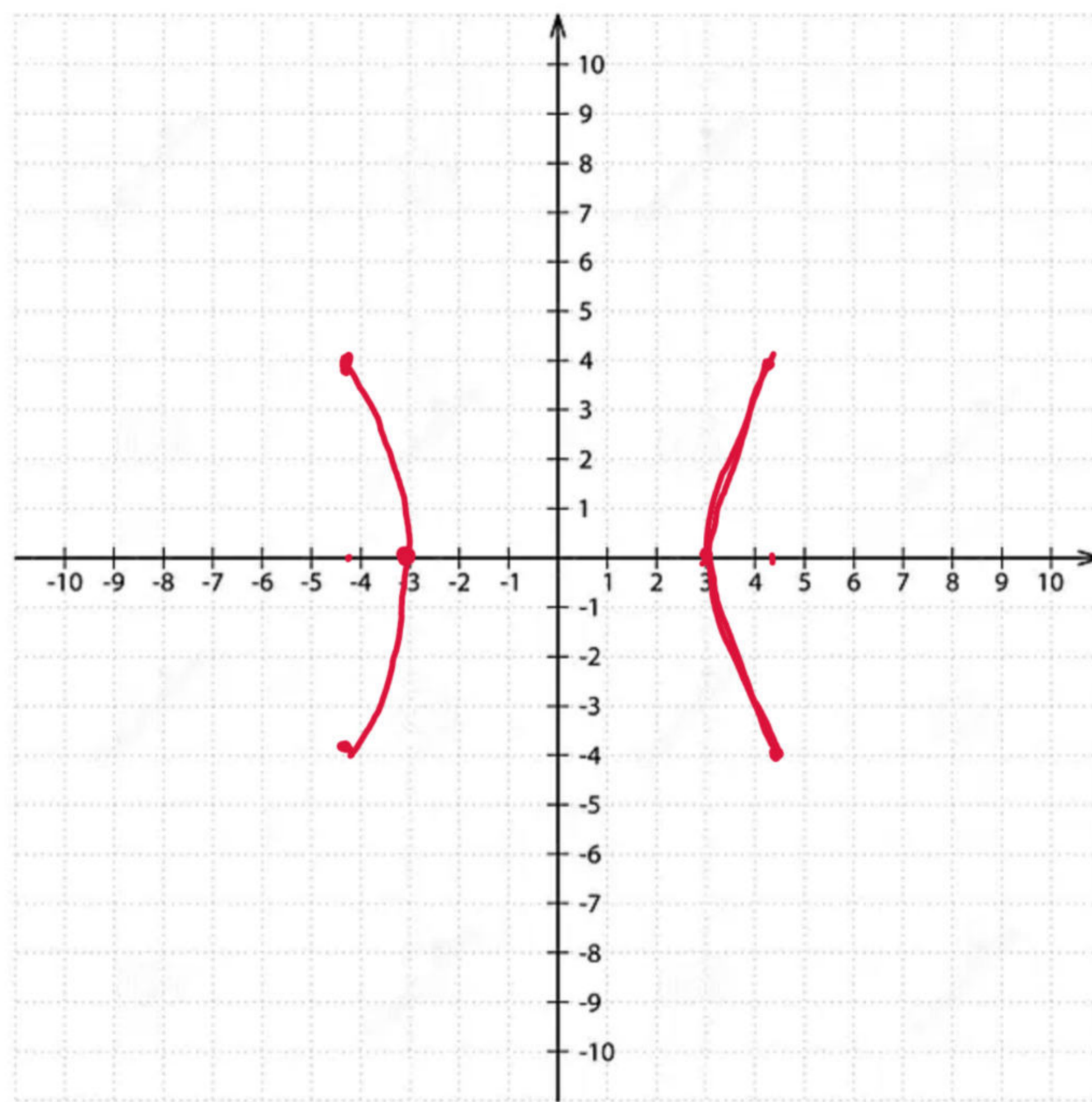
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5. Draw the graph of parametric equations of function  
 $x = a \sec \theta$ ,  $y = b \tan \theta$ , when  $a = 3, b = 4$  and  $-\pi \leq \theta \leq \pi$

$$x = 3 \sec \theta, \quad y = 4 \tan \theta, \quad -\pi \leq \theta \leq \pi$$

$$x = \frac{3}{\cos \theta}$$

$\theta$	$-180^\circ$		$-135^\circ$	$-90^\circ$	$-45^\circ$	$0$	$45^\circ$	$90^\circ$	$135^\circ$		$180^\circ$
$x$	$-3$		$-4.2$	undefined	$4.2$	$3$	$4.2$	undefined	$-4.2$		$-3$
$y$	$0$		$4$	undefined	$-4$	$0$	$4$	undefined	$-4$		$0$



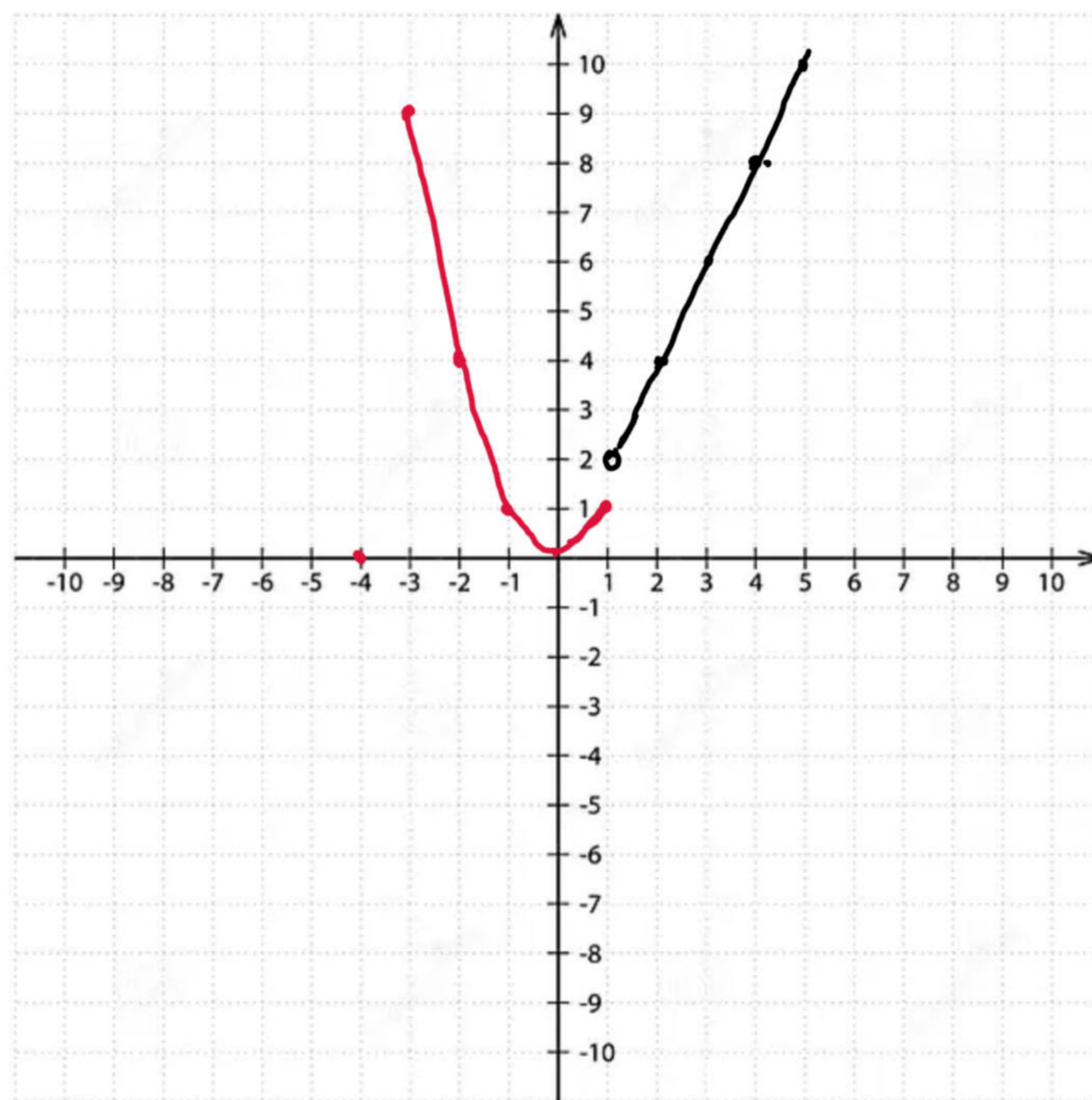
6. Draw the graph of the  $f(x) = \begin{cases} x^2 & x \leq 1 \\ 2x & x > 1 \end{cases}$

$f(x) = x^2, \quad x \leq 1$       Quadratic (parabola)

$x$	-4	-3	-2	-1	0	1
$f(x)$	16	9	4	1	0	1

$f(x) = 2x, \quad x > 1$       Linear (Line)

$x$	1.0001	2	3	4	5	6
$f(x)$	2.0002	4	6	8	10	12



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