Exercise 1·5

Q.1 Draw the Graph of the following equations :

(i) $x^2+y^2=9 \Rightarrow y^2=9-x^2 \Rightarrow y=\pm\sqrt{9-x^2}$

x	-3	-2	-1	0	1	2	3
y	0	± 2.24	± 2.83	± 3	± 2.83	± 2.24	0
(x,y)	$(-3,0)$	$(-2,2.24)$ $(-2,-2.24)$	$(-1,+2.83)$ $(-1,-2.83)$	$(0,3)$ $(0,-3)$	$(1,2.83)$ $(1,-2.83)$	$(2,2.24)$ $(2,-2.24)$	$(3,0)$

(ii) $\frac{x^2}{16}+\frac{y^2}{4}=1 \Rightarrow x^2+4y^2=16 \Rightarrow 4y^2=16-x^2$

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

x	-4	-3	-2	-1	0	1	2	3	4
y	0	± 1.32	± 1.73	± 1.94	± 2	± 1.94	± 1.73	± 1.32	0
(x,y)	$(-4,0)$	$(-3,1.32)$ $(-3,-1.32)$	$(-2,1.73)$ $(-2,1.73)$	$(-1,1.94)$ $(-1,-1.94)$	$(0,2)$ $(0,-2)$	$(1,1.94)$ $(1,-1.94)$	$(2,1.73)$ $(2,-1.73)$	$(3,1.32)$ $(3,-1.32)$	$(4,0)$

(iii) $y=e^{2x} \Rightarrow e\simeq 2.71$

x	-1.5	-1	-0.5	0	0.5	1	1.5
y	0.22	0.37	0.61	1	1.65	2.71	4.45
(x,y)	$(-1.5,0.22)$	$(-1,0.37)$	$(-0.5,0.61)$	$(0,1)$	$(0.5,1.65)$	$(1,2.71)$	$(1.5,4.5)$

(iv) $y=3^x$

x	-1.5	-1	-0.5	0	0.5	1	1.5
y	0.19	0.33	0.58	1	1.73	3	5.2
(x,y)	$(-1.5,0.19)$	$(-1,0.33)$	$(-0.5,0.58)$	$(0,1)$	$(0.5,1.73)$	$(1,3)$	$(1.5,5.2)$

Q.2 Graph the following parametric curves equations:

(i) $x = t$, $y = t^2$ $\quad -3 \leq t \leq 3$ (t is parameter)

t	-3	-2	-1	0	1	2	3
x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

(ii) $x = t - 1$, $y = 2t - 1$ $\quad -1 < t < 5$ (t is parameter)

t	0	1	2	3	4
x	-1	0	1	2	3
y	-1	1	3	5	7

(iii) $x = \sec\theta$, $y = \tan\theta$ (θ is parameter)

θ	-90°	-60°	-30°	0°	30°	60°	90°
x	$+\infty$	2	1.15	1	1.15	2	$+\infty$
y	$-\infty$	-1.73	-0.58	0	0.58	1.73	$+\infty$

Q.3 Draw the graph of the given function and check continuouty:

(i) $y = \begin{cases} x-1 & x < 3 \\ 2x+1 & \text{if } x \geq 3 \end{cases}$

x	0	1	2	3	4	5	6
y	-1	0	1	7	9	11	13

(ii) $y = \dfrac{x^2 - 4}{x - 2}$, $x \neq 2$

x	-1	0	1	3	4	5	6
y	1	2	3	5	6	7	8

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(iii) $y = \begin{cases} x+3 & \text{if } x \neq 3 \\ 2 & \text{if } x = 3 \end{cases}$

x	0	1	2	3	4	5	6
y	3	4	5	2	7	8	9

(iv) $y = \frac{x^2-16}{x-4}$, $x \neq 4$

x	1	2	3	5	6	7
y	5	6	7	9	10	11

Q.4 Find the graphical solutions of the following equations:

(i) $x = \sin 2x$

Let $y = x$ and $y = \sin 2x$

x	-2	-1	0	1	2	3
$y=x$	-2	-1	0	1	2	3

x	-90°	-60°	-30°	0°	30°	60°	90°
$y=\sin 2x$	0	-0.86	-0.86	0	0.86	0.86	0

(ii) $x/2 = \cos x$

Let $y = x/2$ and $y = \cos x$

x	-2	-1	0	1	2	3
$y=x/2$	-1	-0.5	0	0.5	1	1.5

x	-90°	-60°	-30°	0°	30°	60°	90°
$y=\cos x$	0	0.5	0.86	1	0.86	0.5	0

(iii) $2x = \tan x$

Let $y = 2x$ and $y = \tan x$

x	-2	-1	0	1	2	3
$y=2x$	-4	-2	0	2	4	6

x	-90°	-60°	-30°	0°	30°	60°	90°
$y=\tan x$	$-\infty$	-1.73	-0.58	0	0.58	1.73	$+\infty$

Some Useful Defination:-

Constant Function:-

"The function whose range is a definate and fix number is called constant function."

i.e. $y = 3a$ (for any value of x, $y = 3a$)

Exponential Function:-

"The function inwhich variable appears as an exponent (Power) is called Exponential function."

i.e. $y = e^x$ $y = a^x$ where $e \approx 2.7184$, $a \in N$

Logarithmic Functions:-

"The function containing the Logarithmic opesators are called Logarithmic functions."

i.e. $y = \log_a x$ Commen or Briggs Logarithmic function with $a > 0$, $a \neq 1$

$y = \ln x$ Natural or Napsian Logrithmic function with $e \simeq 2.7183$ and $\log_e x = \ln e$

* "Logarithm is an operator which changes a function or term into another equivalent function or term."

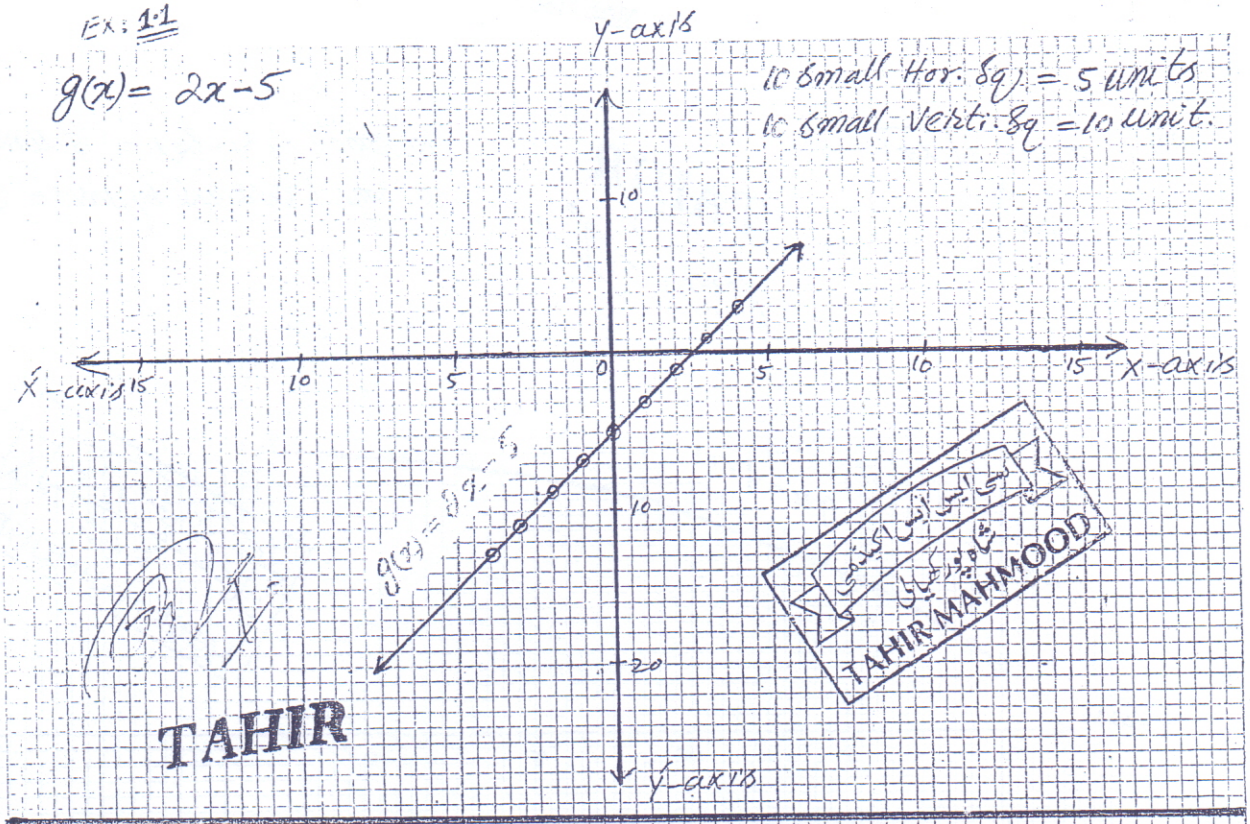
$y = \log_a x \Rightarrow x = a^y$ are equivalent equations having similar value.

Similarly $y = \ln x \Rightarrow x = e^y$

Ex: 1.1

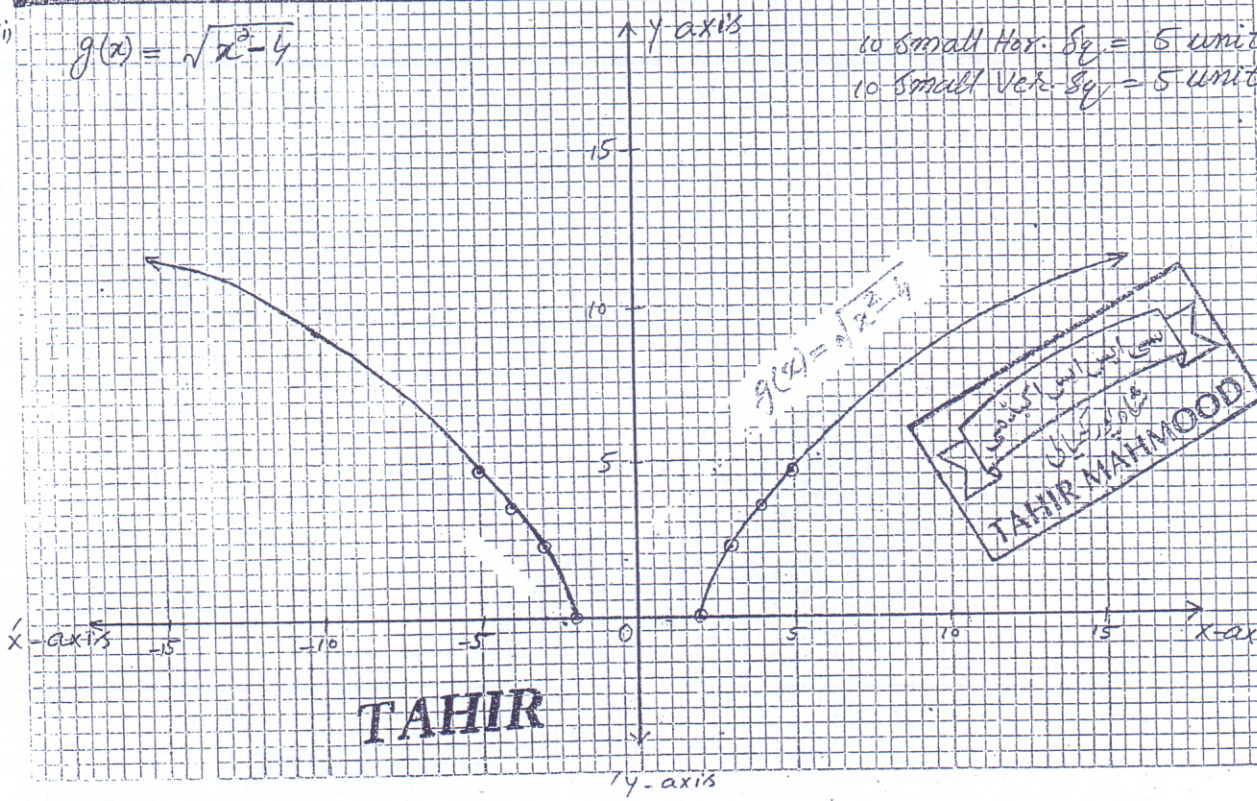
(i) $g(x) = 2x - 5$

10 Small Hor. Sq = 5 units
10 Small Verti. Sq = 10 unit.



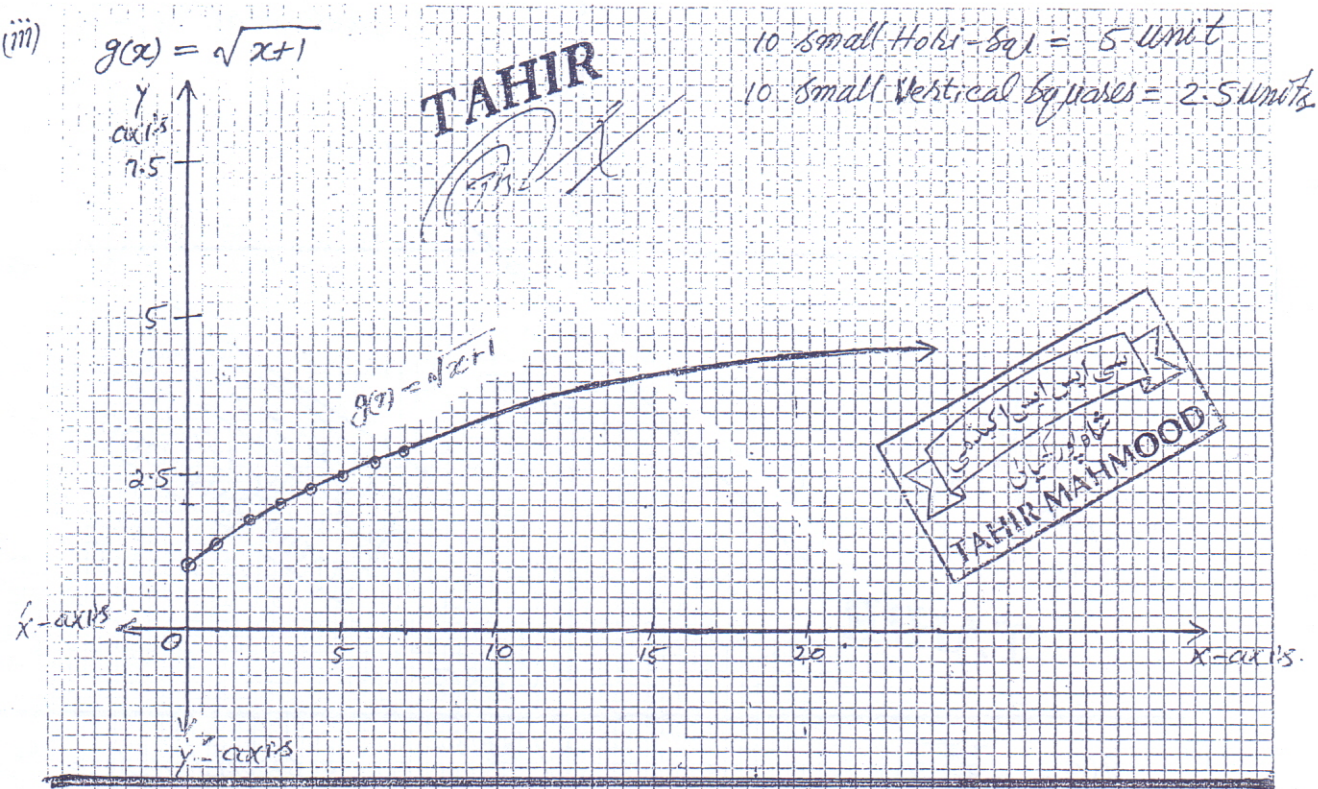
(ii) $g(x) = \sqrt{x^2 - 4}$

10 Small Hor. Sq = 5 unit
10 Small Ver. Sq = 5 unit.



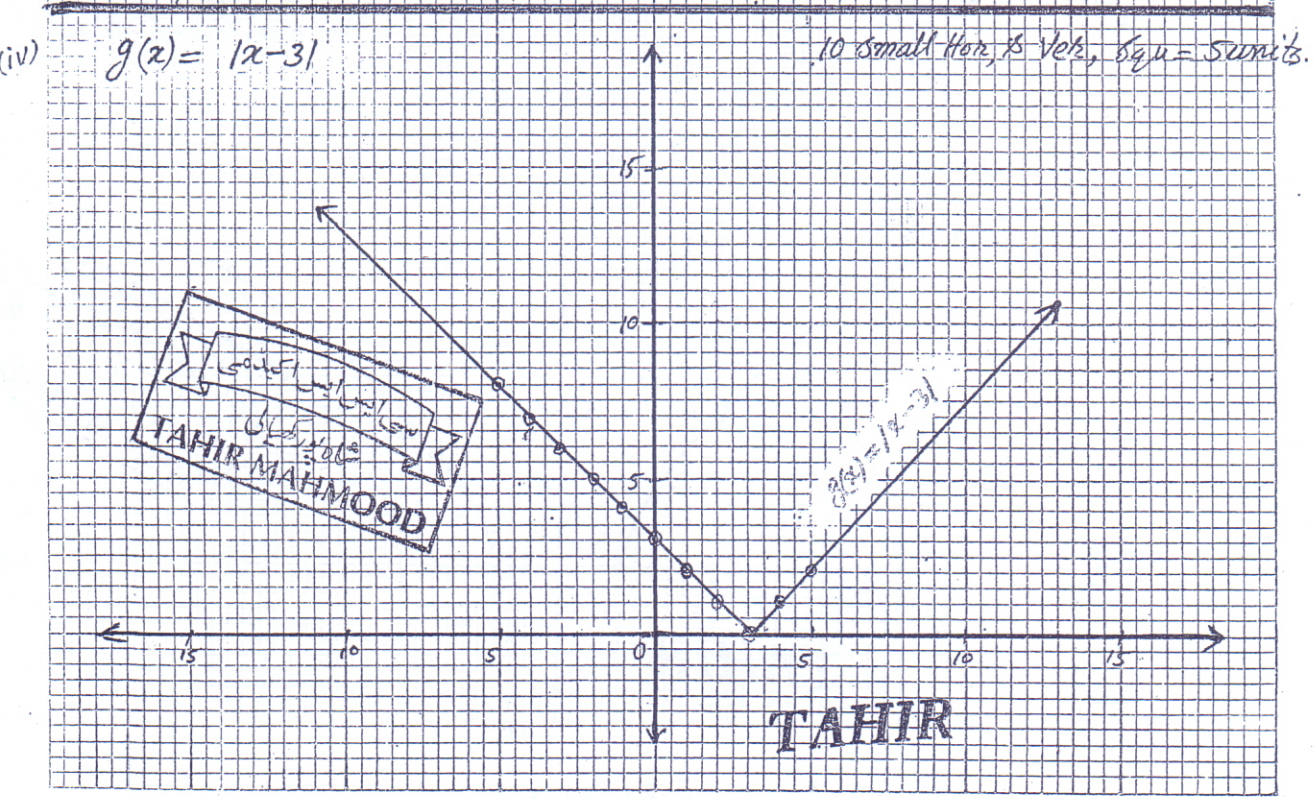
(iii) $g(x) = \sqrt{x+1}$

10 Small Hori-Sqs = 5 units
10 Small Vertical Sqs = 2·5 units



(iv) $g(x) = |x-3|$

10 Small Hor, & Vert, Sqs = 5 units.



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i) $g(x) = \begin{cases} 6x+7 & x \leq -2 \\ 4x-3 & x > -2 \end{cases}$

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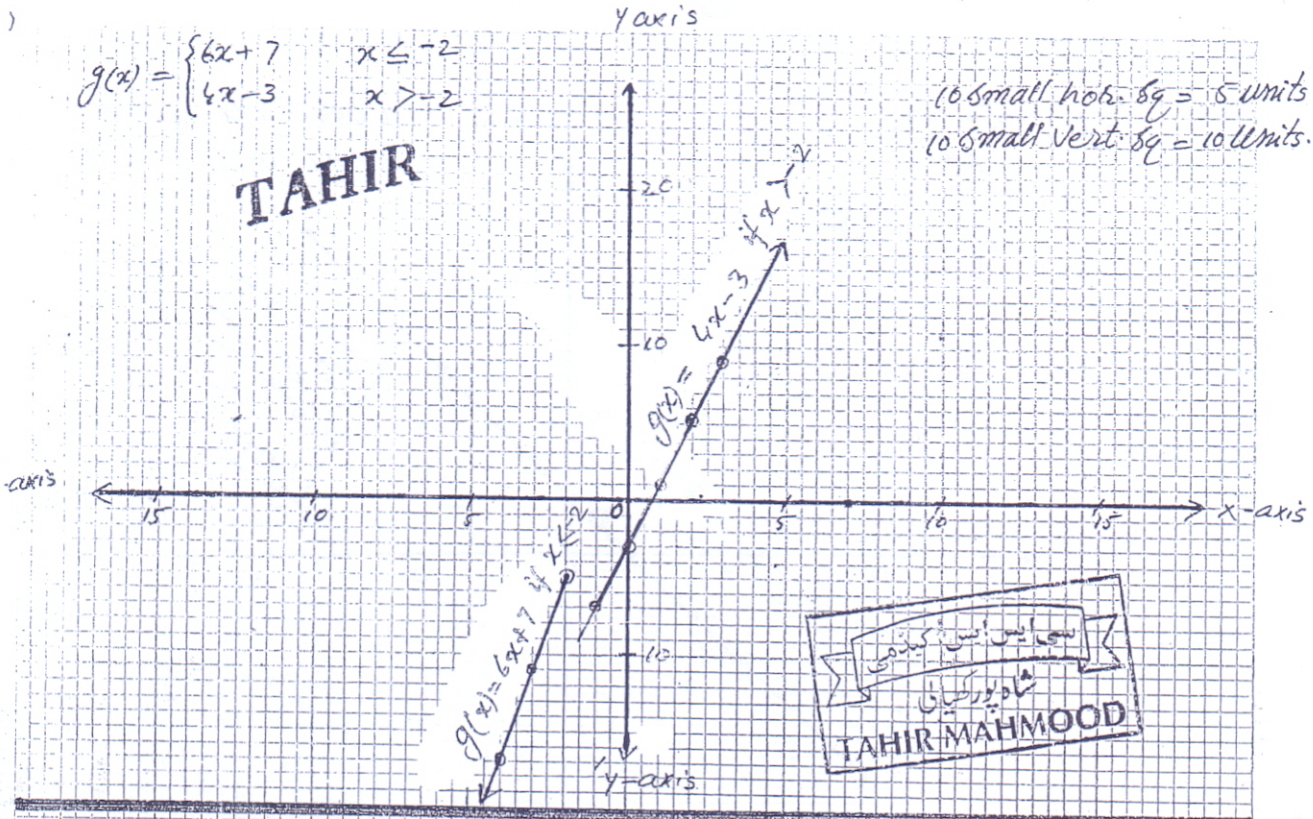
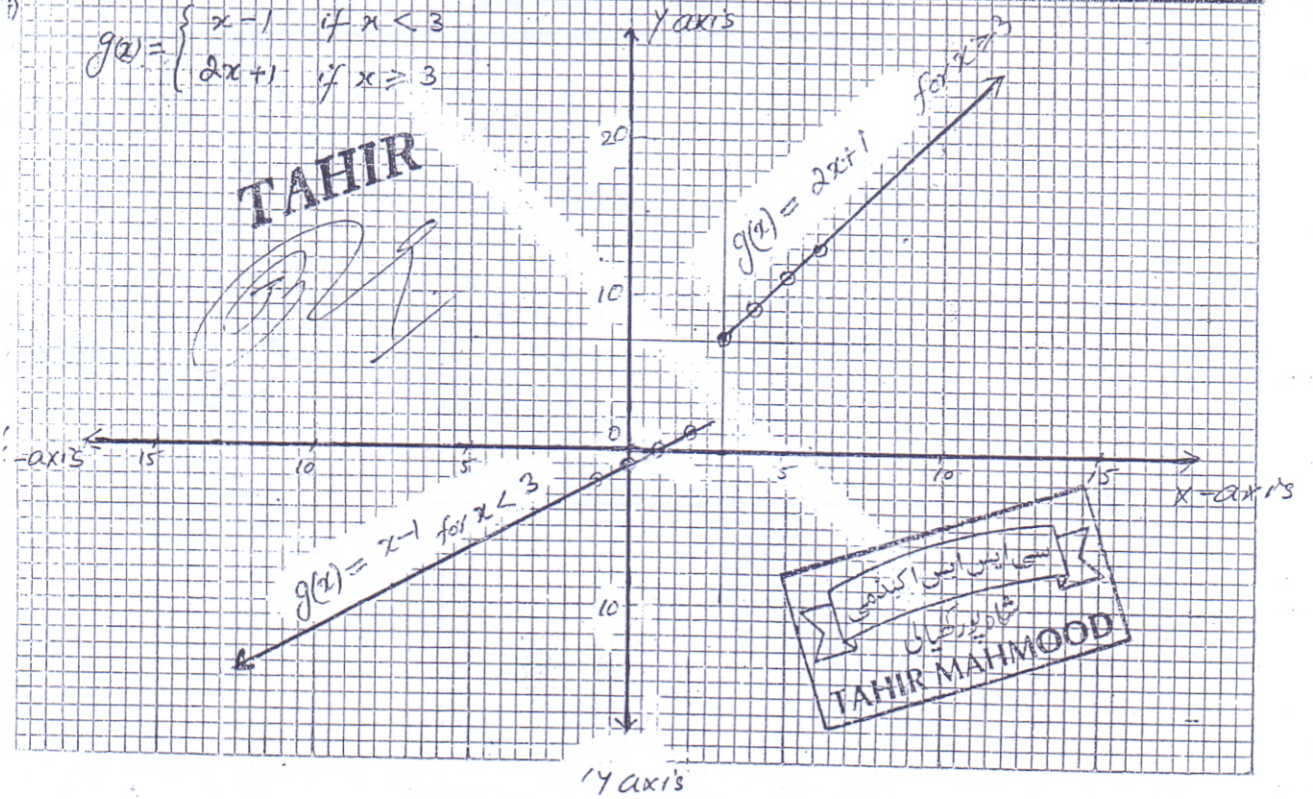
1 Small hor. Sq = 5 units
1 Small Vert. Sq = 10 units.



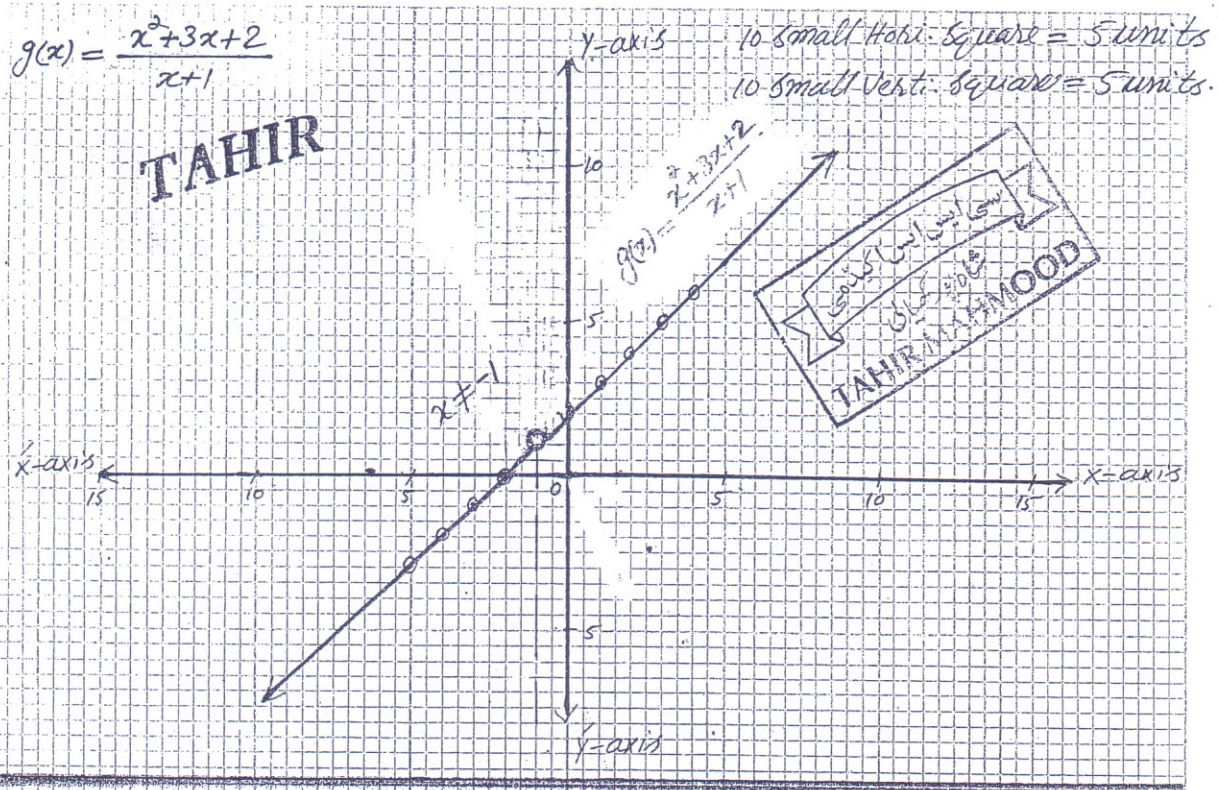
ii) $g(x) = \begin{cases} x-1 & \text{if } x < 3 \\ 2x+1 & \text{if } x \geq 3 \end{cases}$

TAHIR



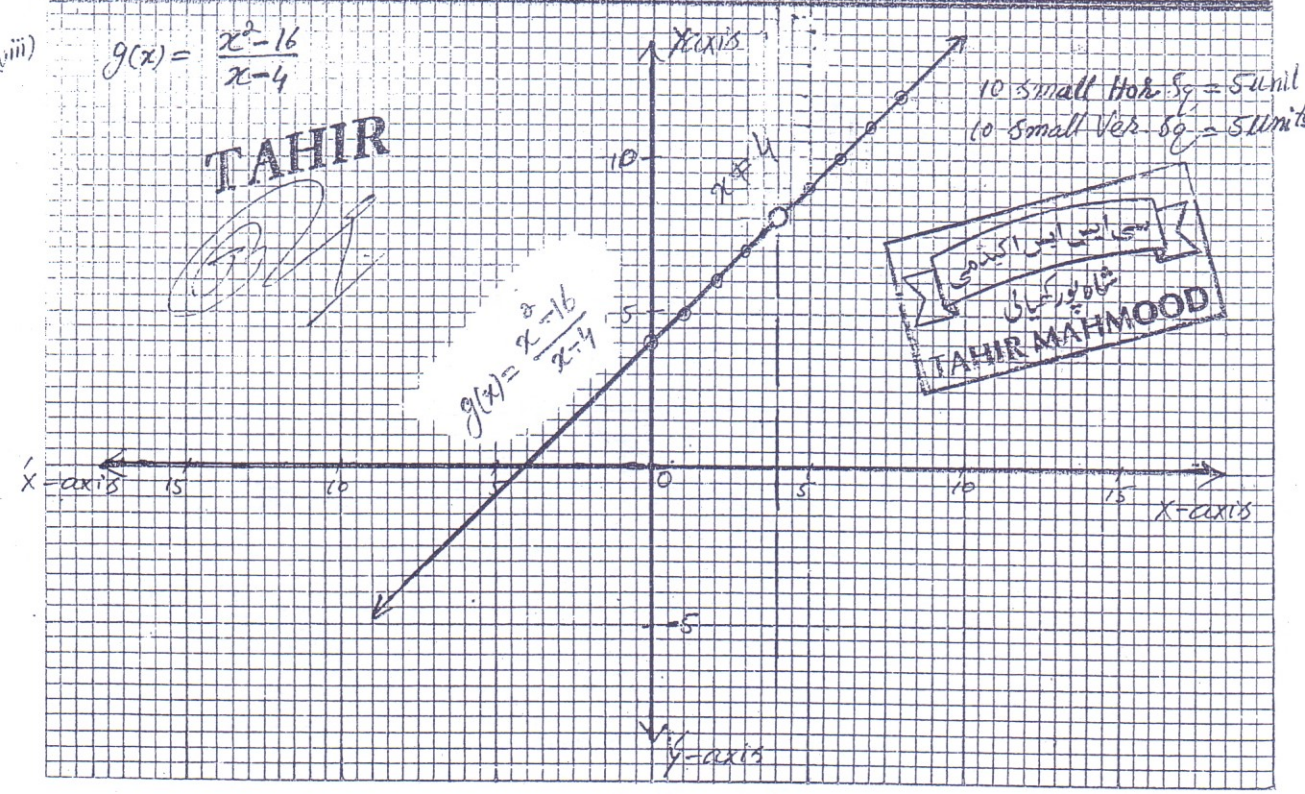
(vii) $g(x) = \dfrac{x^2+3x+2}{x+1}$

TAHIR



(viii) $g(x) = \dfrac{x^2-16}{x-4}$

TAHIR



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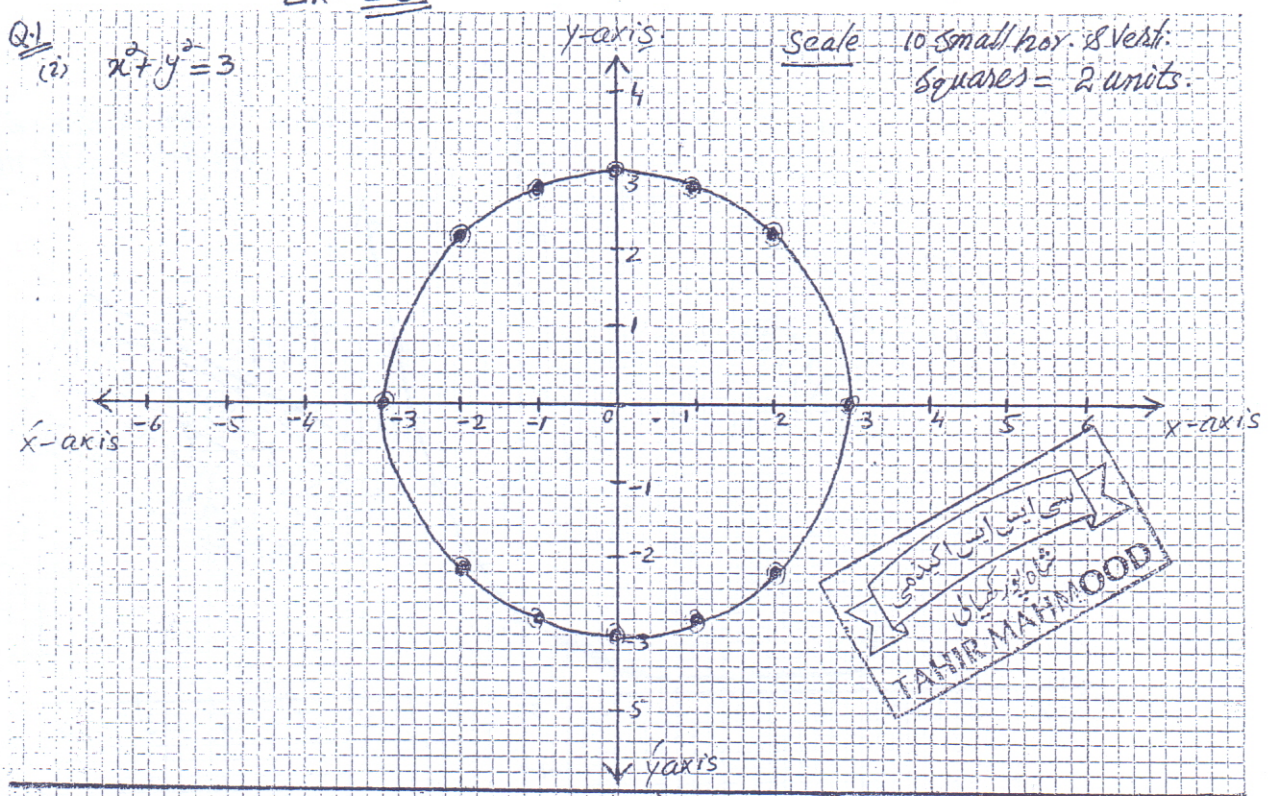
Ex. 1.5

Q.1

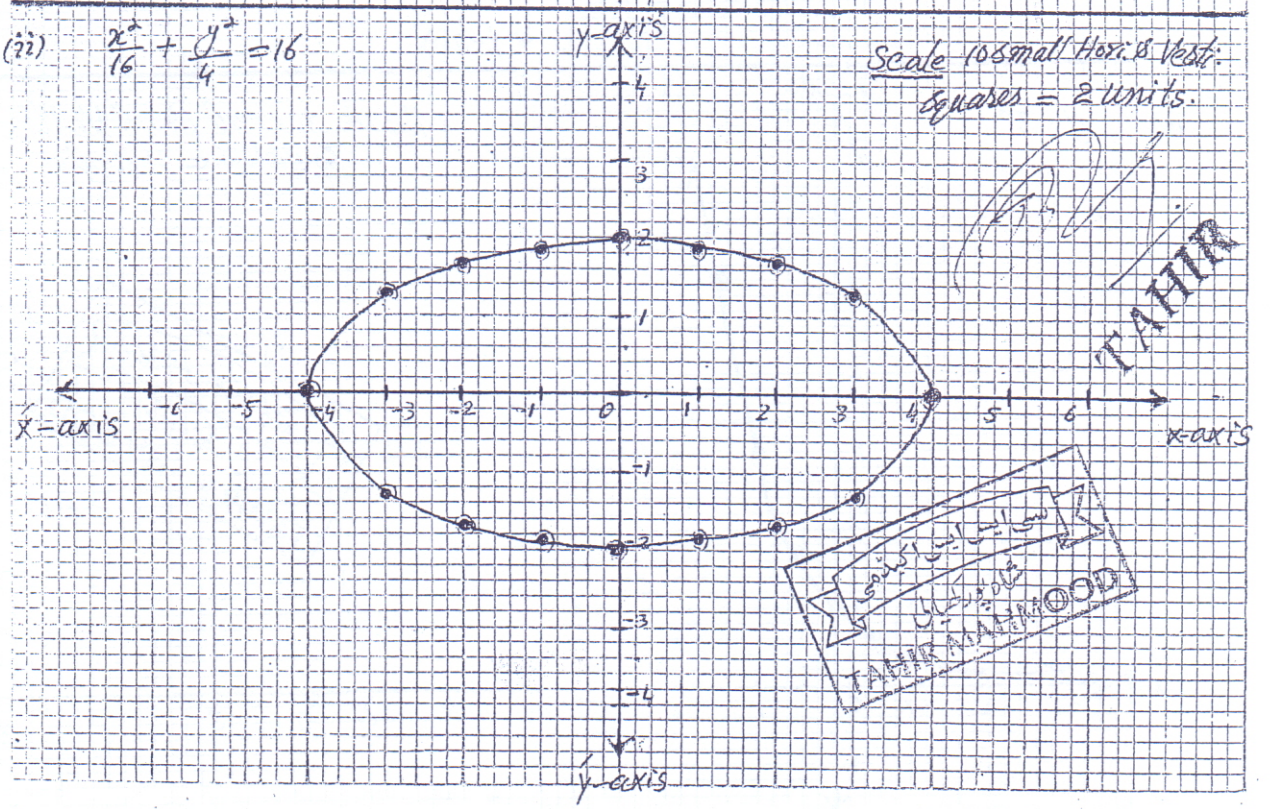
(i) $x^2 + y^2 = 3$

Scale 10 small hor. & Vert. Squares = 2 units.



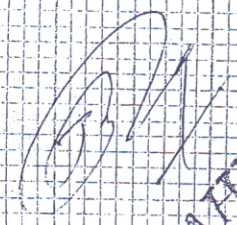
(ii) $\frac{x^2}{16} + \frac{y^2}{4} = 16$

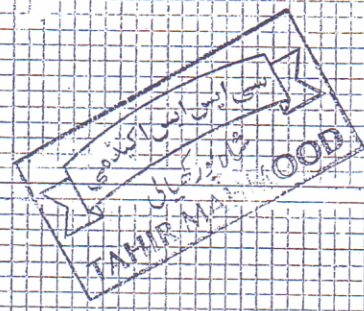
Scale 10 small Hori. & Vert. Squares = 2 units.



(iii) $y = e^{2x}$

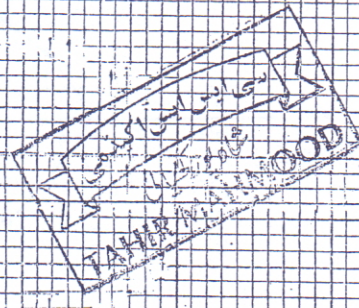
Scale: 10 small Hor. & Vert. Squares = 2 units





(iv) $y = 3^x$

Scale: 10 small Hor. & Vert. Squares = 2 units.



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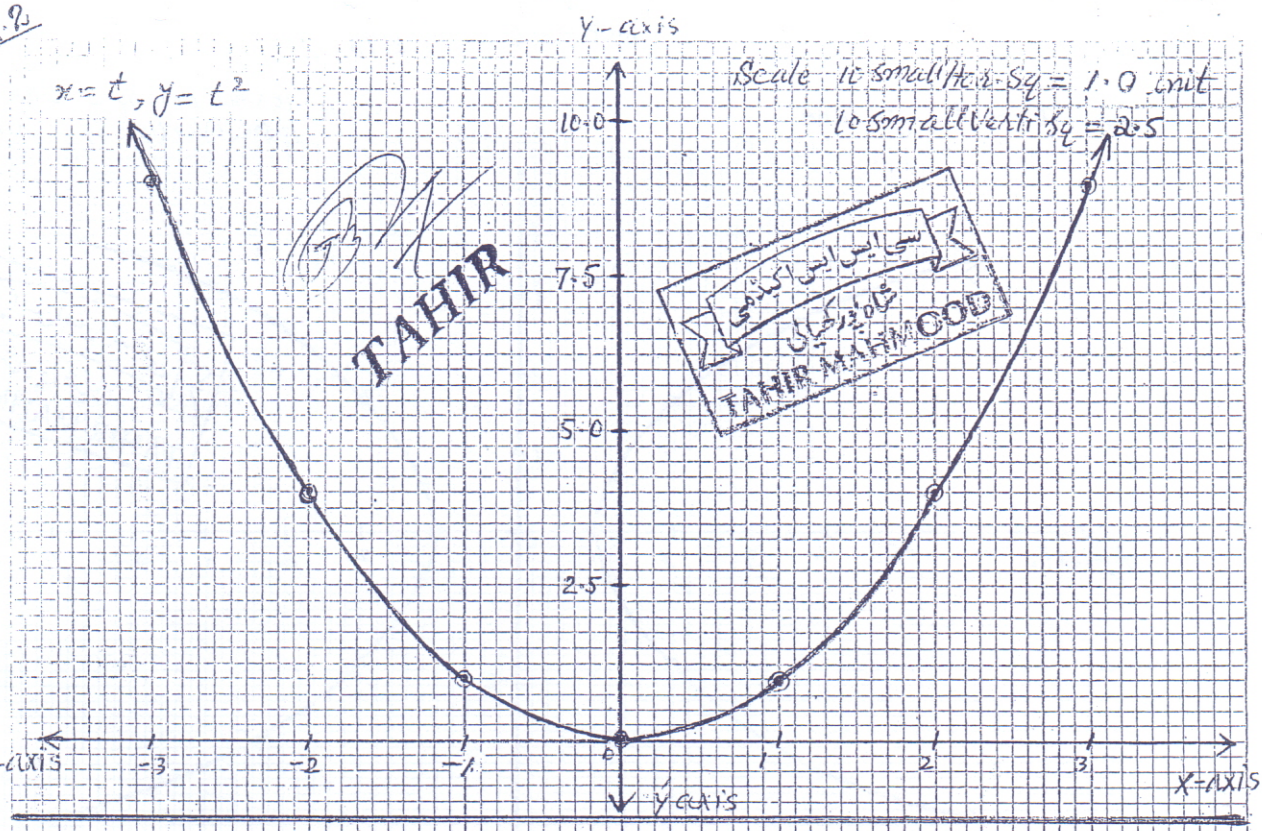
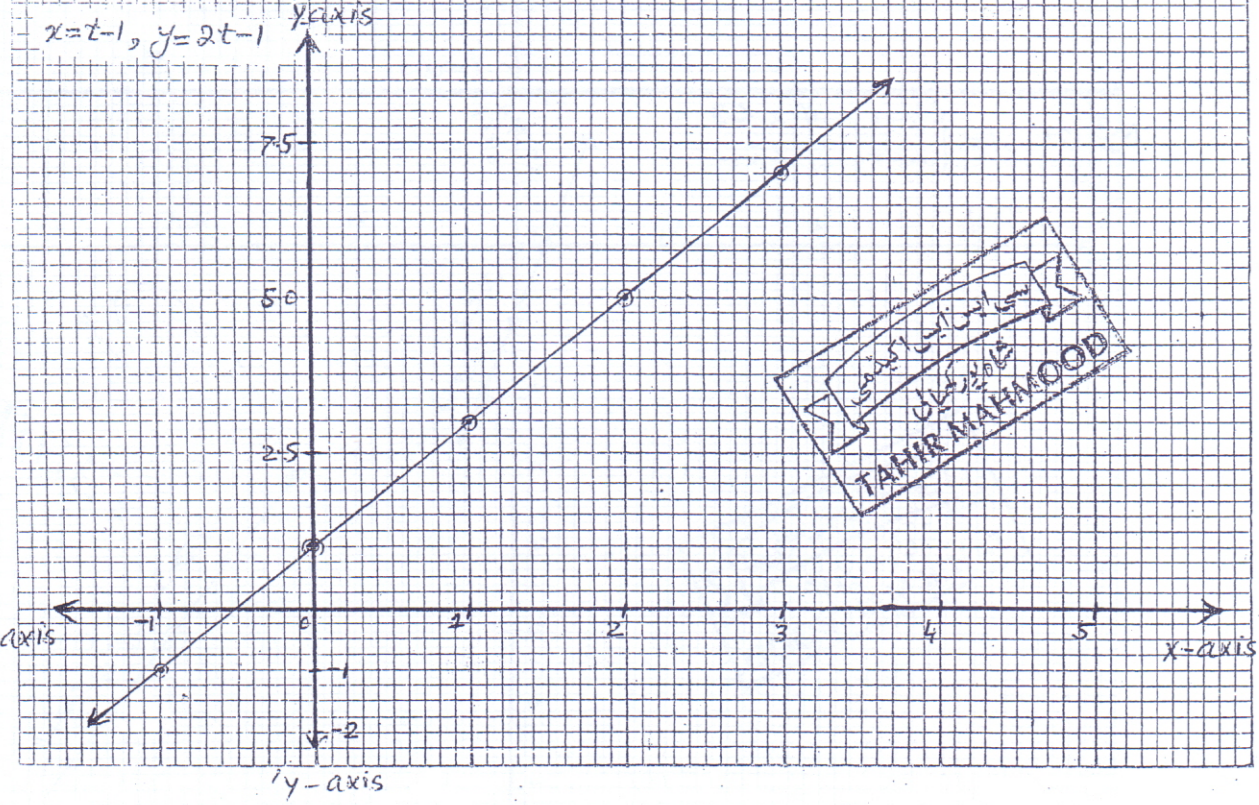
Q.2

(i) $x = t, y = t^2$



(ii) $x = t-1, y = 2t-1$



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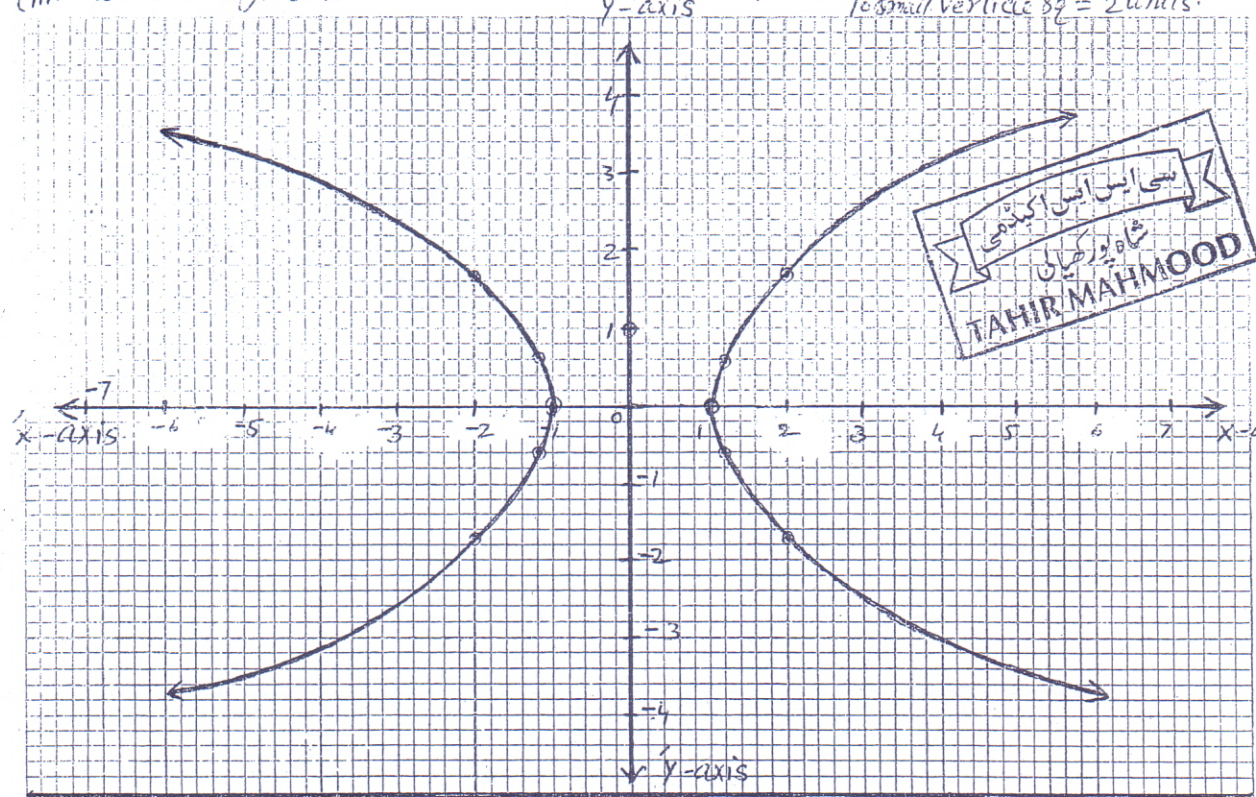
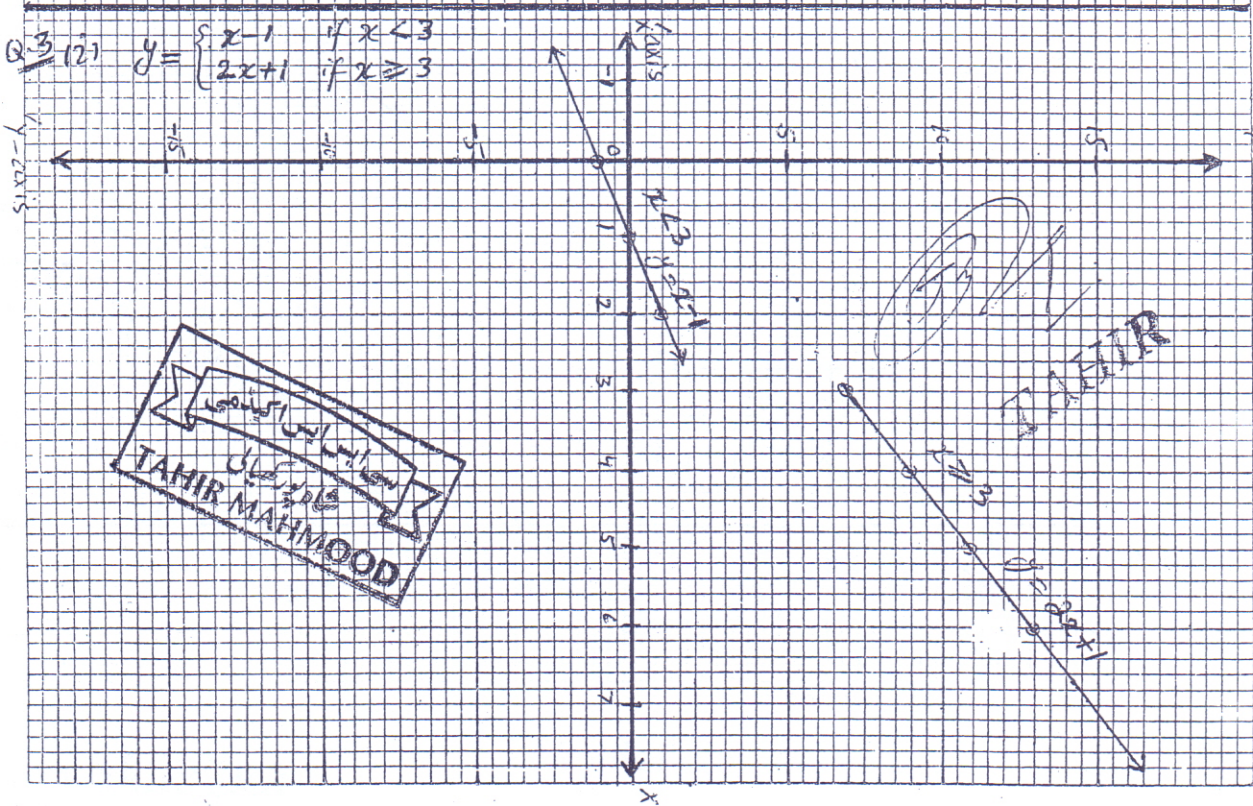
(iii) $x = \sec\theta$ $y = \tan\theta$

Scale 10 small Hor. Sq = 2 units
10 small Vertical Sq = 2 units.



Q.3 (2) $y = \begin{cases} x-1 & \text{if } x < 3 \\ 2x+1 & \text{if } x \geq 3 \end{cases}$



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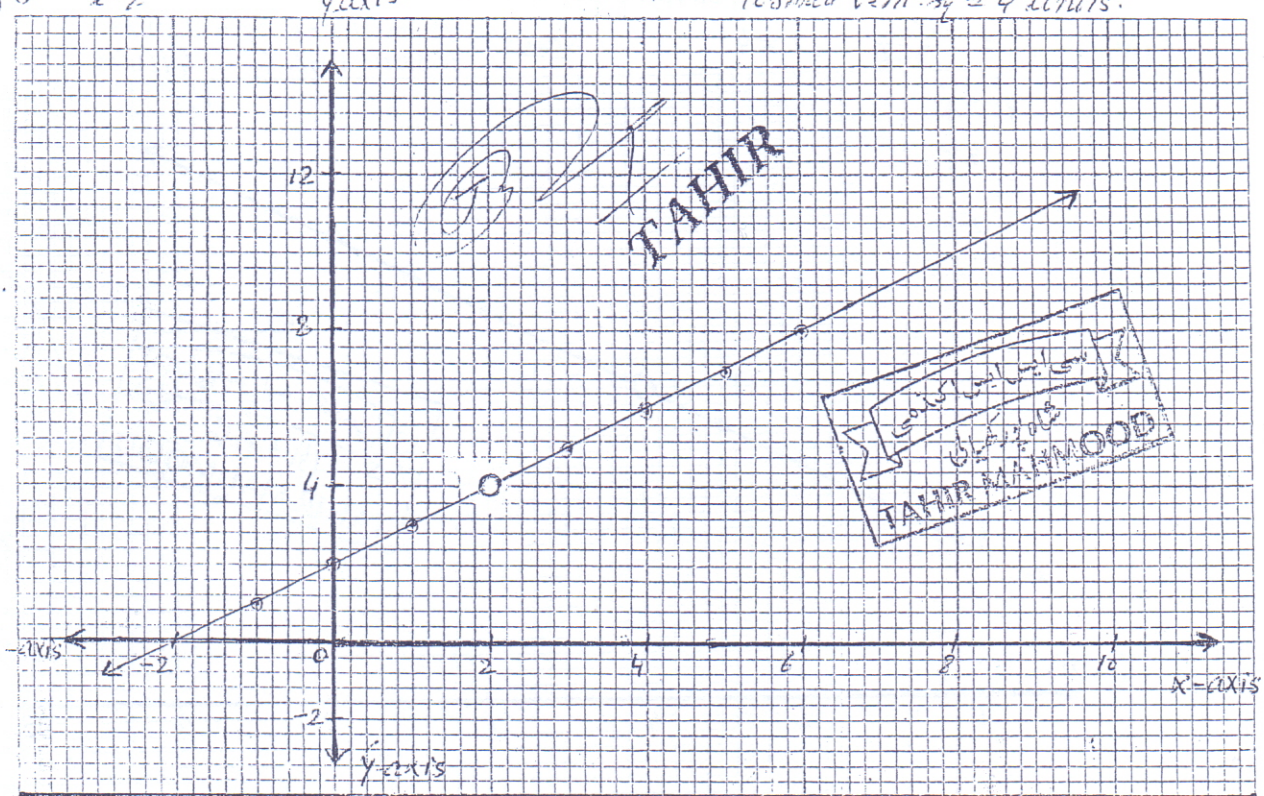
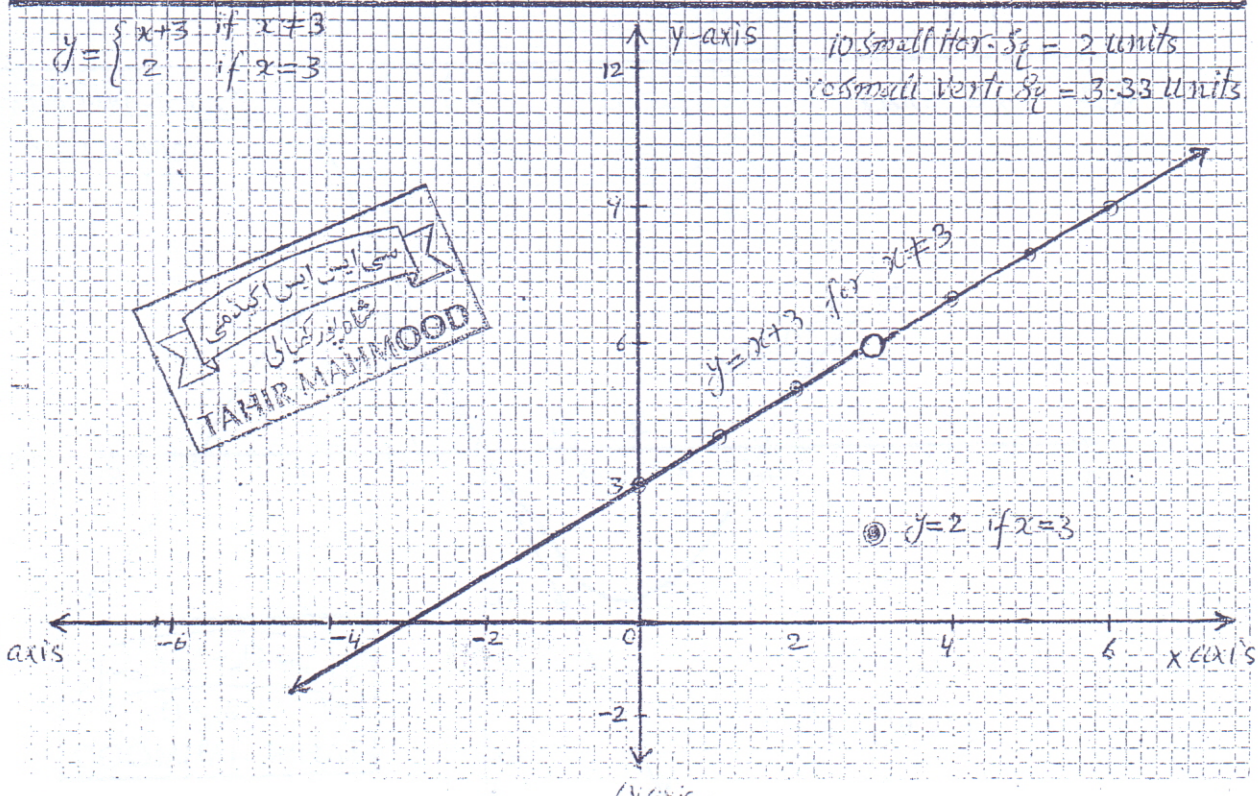
(ii) $y = \frac{x^2-4}{x-2}$, $x \neq 2$

Scale: 10 small Hor. S_x = 2 units
10 small Verti. S_y = 4 units.

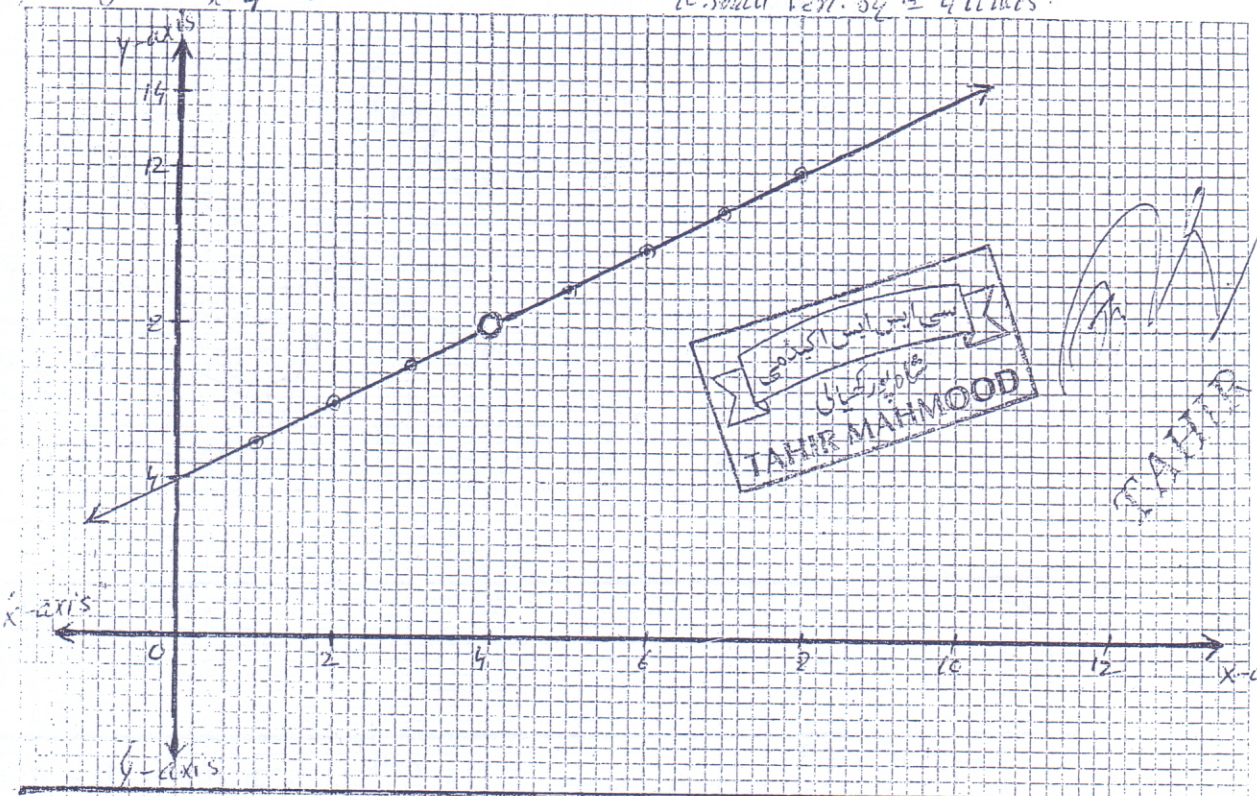


(iii) $y = \begin{cases} x+3 & \text{if } x \neq 3 \\ 2 & \text{if } x = 3 \end{cases}$

10 small Hor. S_x = 2 units
10 small Verti. S_y = 3.33 units

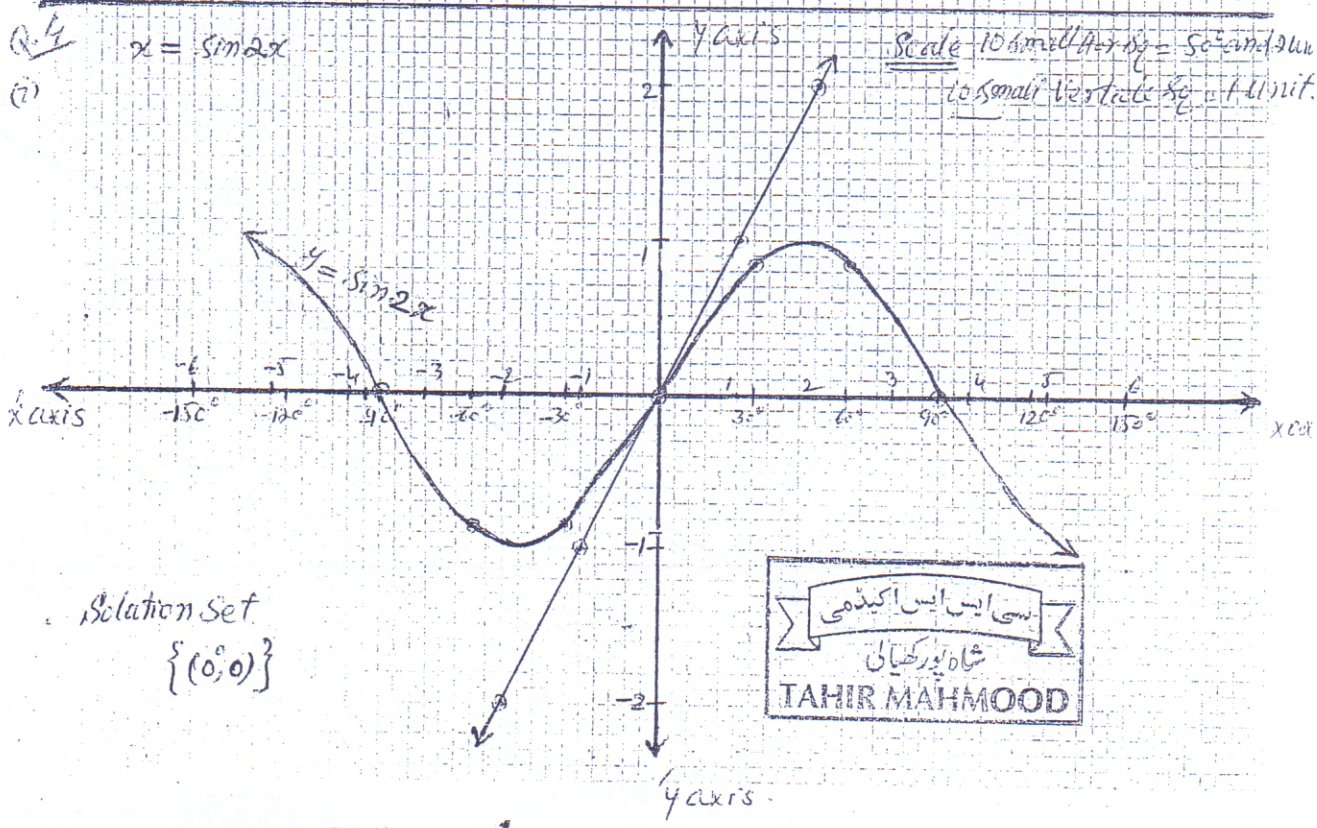


(iv) $y = \frac{x^2-16}{x-4}$, $x \neq 4$ Scale 10 Small Hor. Sq = 2 units
10 Small Vert. Sq = 4 units.



Q.4 $x = \sin 2x$

(i)



Solution Set
$\{(0^c, 0)\}$

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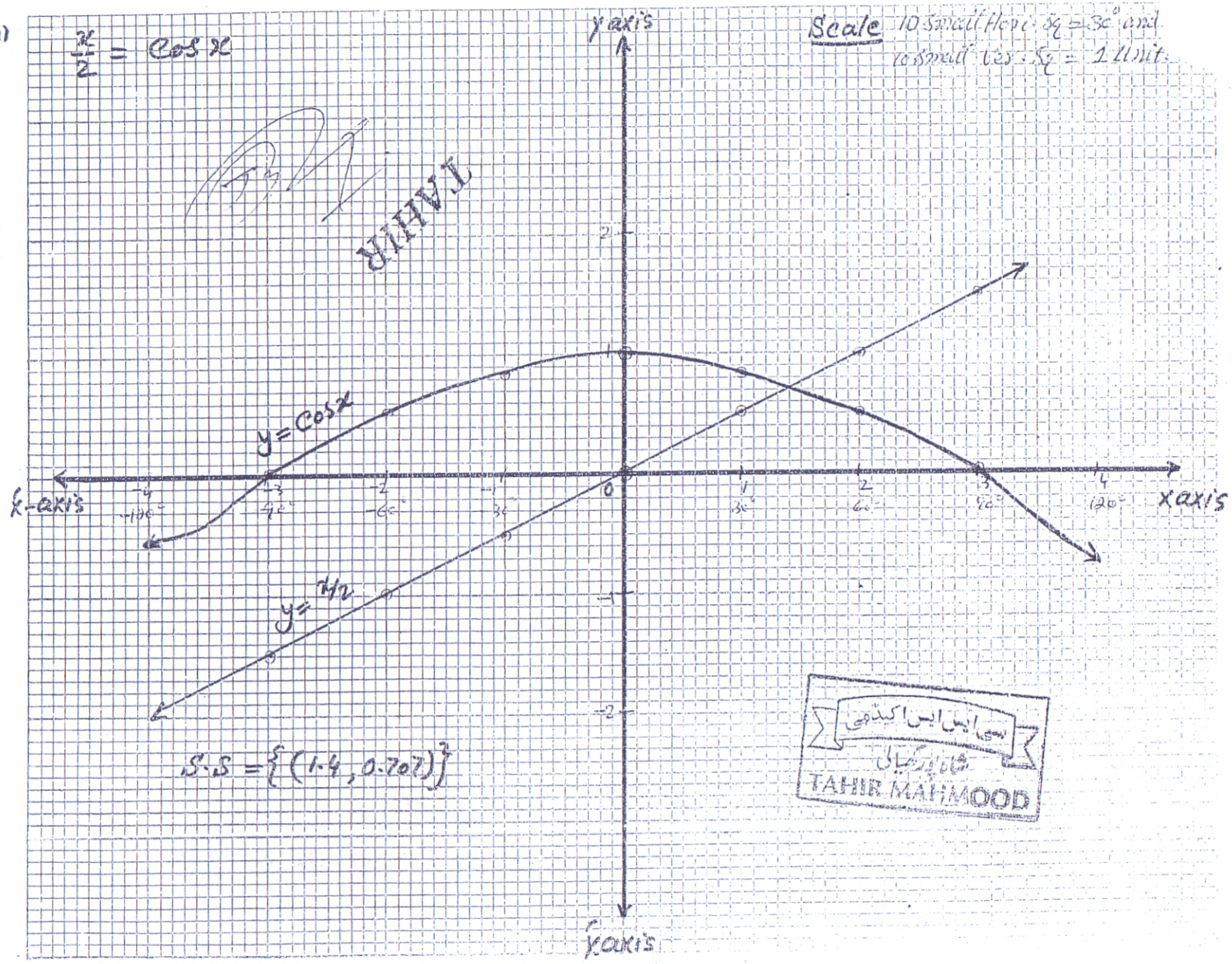
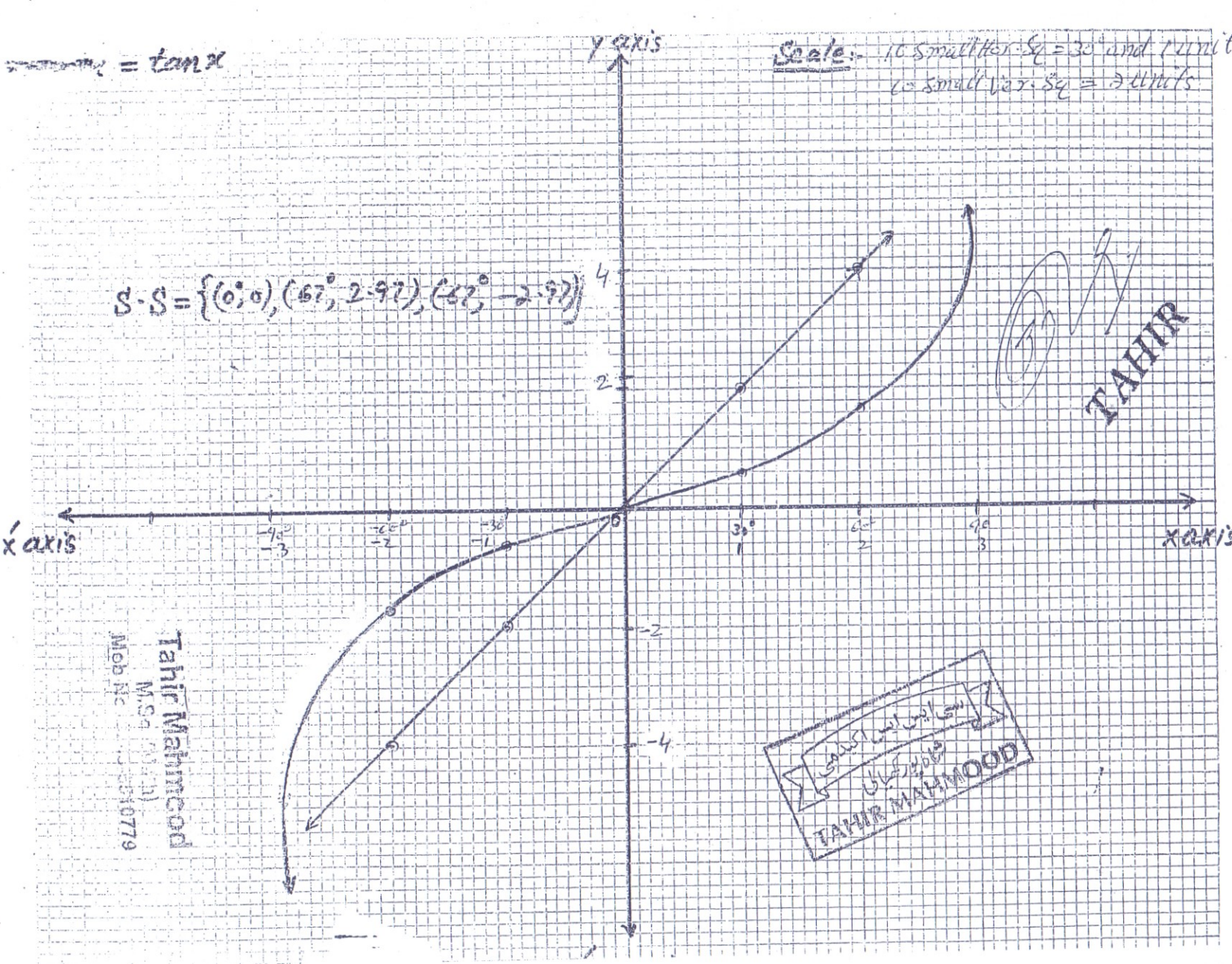
(ii) $\frac{x}{2} = \cos x$



$y = \tan x$


Scale:- 10 small hor. Sq = 30° and 1 unit
10 small ver. Sq = 2 units
y axis
x axis
x axis
S.S = {(0, 0), (45°, 2.97), (-45°, -2.97)}
4
2
-2
-4
-90°
-3
-60°
-2
-30°
-1
30°
1
60°
2
90°
3
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