Name: _____ **Precalc 12**

USUAL FUNCTIONS - worksheet

1. Rewrite in slope-intercept form:

a) $3x - 5y + 12 = 0$

$5y = 3x + 12$

$\boxed{y = \frac{3}{5}x + \frac{12}{5}}$

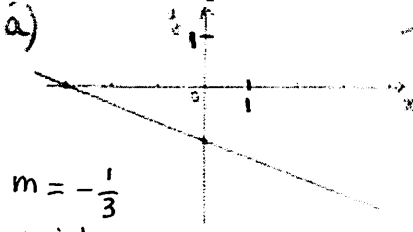
b) $y - 4 = \frac{2}{3}(x + 4)$ $\quad y - 4 = \frac{2}{3}x + \frac{8}{3}$

$y = \frac{2}{3}x + \frac{8}{3} + 4$

$\boxed{y = \frac{2}{3}x + \frac{20}{3}}$

2. Determine the equations of the following linear situations:

a)

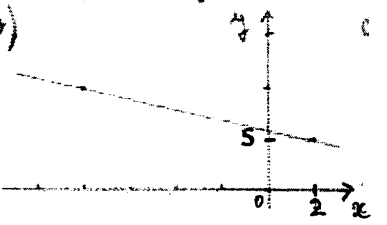


$m = -\frac{1}{3}$

y-int: -1

$\boxed{y = -\frac{1}{3}x - 1}$

b)



$m = -\frac{5}{10} = -\frac{1}{2}$

$P(2,5)$

$\boxed{y - 5 = -\frac{1}{2}(x - 2)}$

or $y = -\frac{1}{2}x + 6$

c) Your phone bill is made of a flat fee and some extra charges for each GB that you have downloaded. If you downloaded 100GB, your bill is \$70. If you downloaded 40GB, your bill is \$61. ← linear situation!

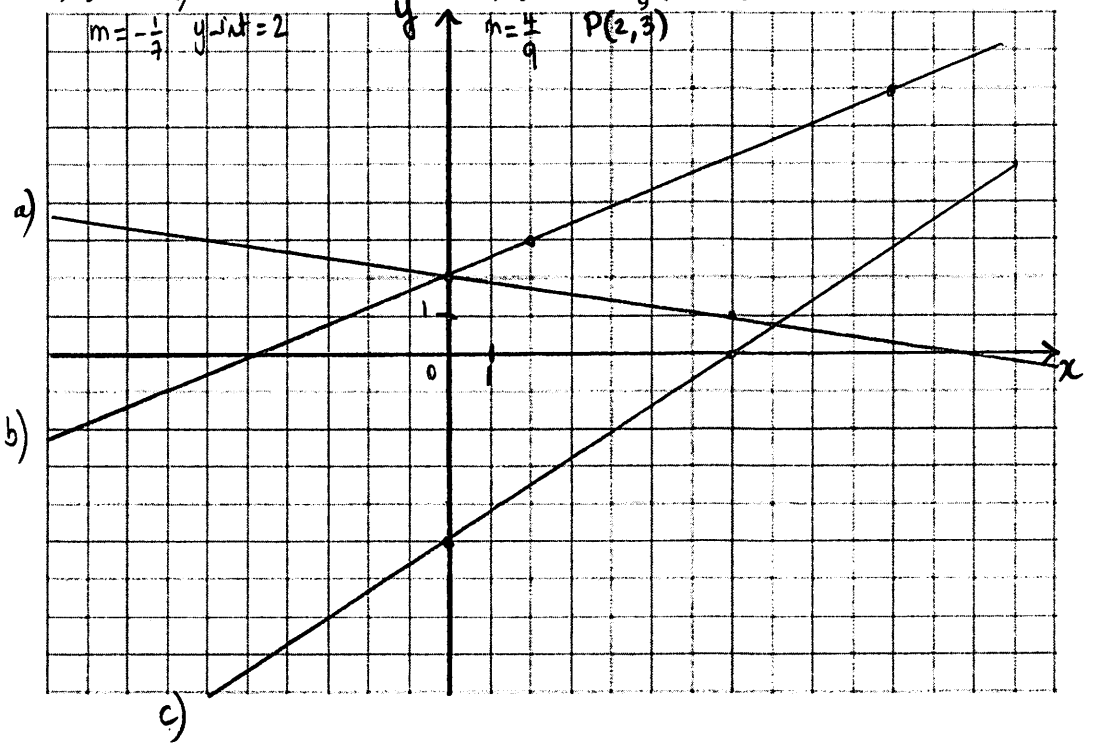
x: #GB downloaded $\quad A(100, 70)$ $\quad m = \frac{9}{60} = \frac{3}{20}$

y: bill (\$) $\quad B(40, 61)$

$y - 70 = \frac{3}{20}(x - 100)$ $\quad \boxed{y = \frac{3}{20}x + 55}$

3. Graph the following functions with precision:

a) $y = -\frac{1}{7}x + 2$ $\quad$ b) $y - 3 = \frac{4}{9}(x - 2)$ $\quad$ c) $5x - 7y = 35$



$-7y = -5x + 35$

$y = \frac{5}{7}x - 5$

$m = \frac{5}{7}$ $\quad$ y-int: -5

4. Is the point (-300 ; 100) on the line: $y = \frac{2}{3}x + 102$?

100	$\frac{2}{3} \times (-300) + 102$
	$-200 + 102 \neq 100$ NO!

5. Let's consider A(0 ; 4), B(5 ; -3), C(2 ; -5) et D(-3 ; 2).
   a) prove that lines (AB) and (CD) are parallels.

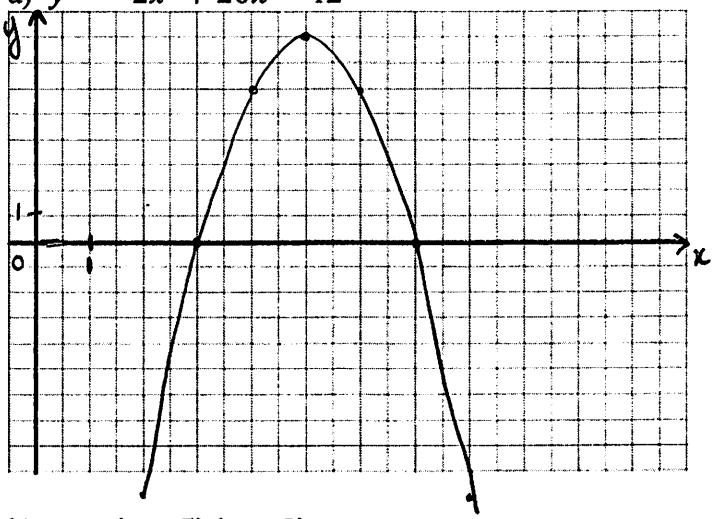
$m_{AB} = \frac{-3-4}{5-0} = -\frac{7}{5}$ $m_{CD} = \frac{2+5}{-3-2} = -\frac{7}{5}$ same slope $\Rightarrow$ parallels

   b) Is ABCD a rectangle ?

$m_{BC} = \frac{-5+3}{2-5} = \frac{-2}{-3} = \frac{2}{3} \neq \frac{5}{7}$ (AB) is not perpendicular to BC $\Rightarrow$ ABCD is not a rectangle !

6. Graph the following functions. Determine their exact characteristics. Make a table of values. Détermine their domain and range.

a) $y = -2x^2 + 20x - 42$



vertex: $\frac{-b}{2a} = \frac{-20}{-4} = 5$

$-2(5)^2 + 20(5) - 42 = 8$ } (5,8)

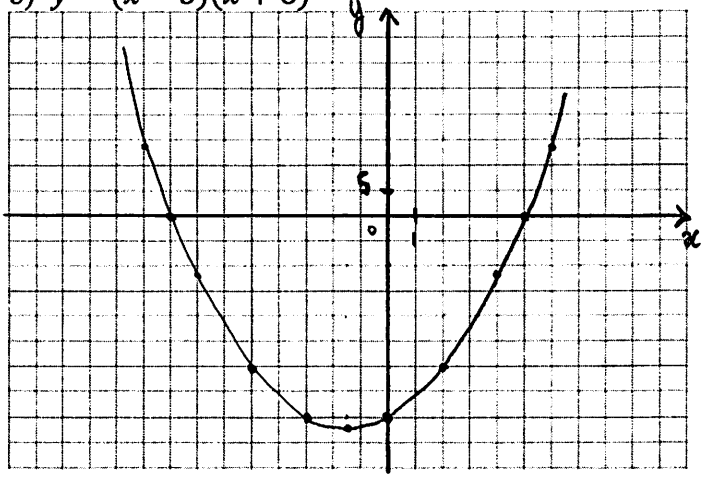
zeros: $y = -2(x-7)(x-3)$

$x = 7$ & $x = 3$

y-int: -42

x	6	8	
y	6	-10	

b) $y = (x-5)(x+8)$



zeros: 5 & -8

vertex (in the middle between the zeros)

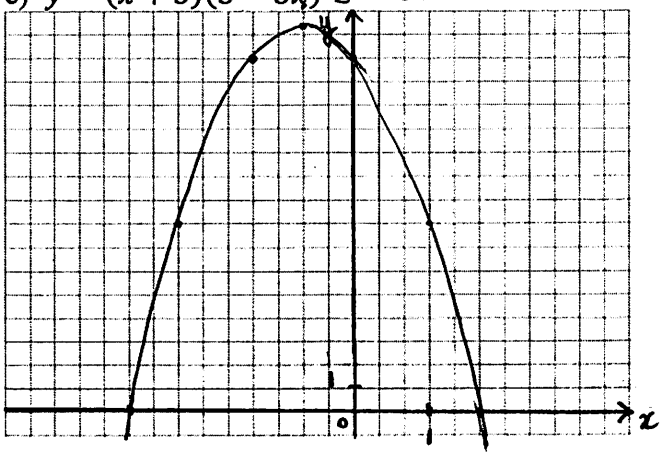
$\left(-\frac{3}{2}, -\frac{169}{4}\right)$

-1.5 -42.25

y-int: -40

x	2	4	6
y	-30	-12	14

c) $y = (x+3)(5-3x) = -3x^2 - 4x + 15$



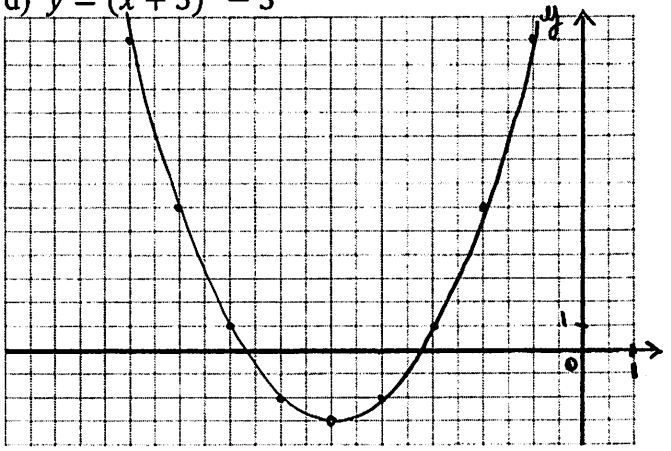
Zeros: -3 & $5/3$

Vertex: $\left(-\frac{2}{3}, \frac{49}{3}\right)$ $\quad -0.\overline{6} \quad 16.\overline{3}$

y-int: 15

x	1	2	
y	8	-5	

d) $y = (x+5)^2 - 3$



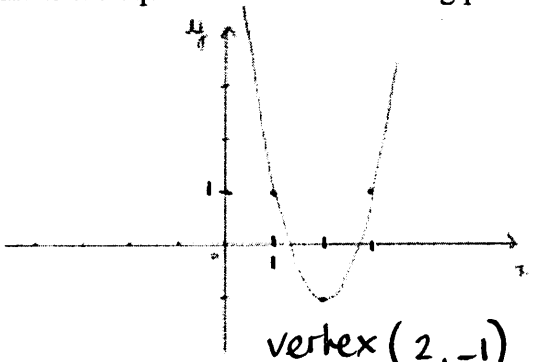
vertex: $(-5, -3)$

y-int: 22

x	-4	-3	-2	-1
y	-2	1	6	13

7. Determine the equations of the following parabolas:

a)



vertex $(2, -1)$

Point $(1, 1)$

$y = a(x-2)^2 - 1$

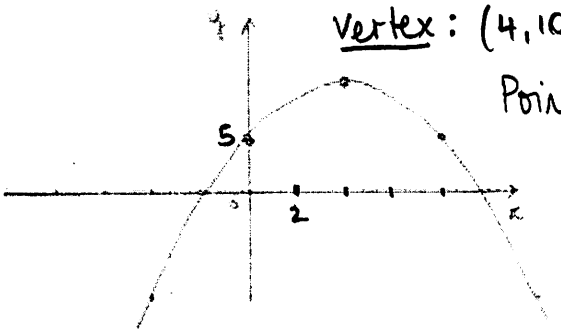
$\hookrightarrow 1 = a(1-2)^2 - 1$

$1 = a - 1$

$a = 2$

$y = 2(x-2)^2 - 1$

b)



Vertex: (4,10)

Point (0,5)

$y = a(x-4)^2 + 10$

$\hookrightarrow 5 = a(0-4)^2 + 10$

$5 = 16a + 10$

$-5 = 16a$

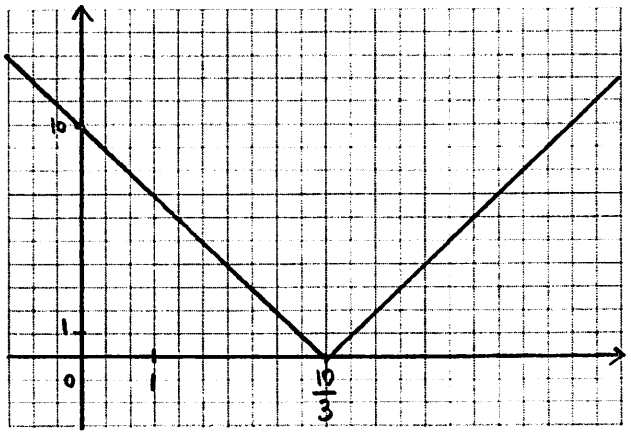
$a = -\frac{5}{16}$

$y = -\frac{5}{16}(x-4)^2 + 10$

8. Graph the following functions and write them piecewise:

a) $y = |3x - 10|$

$$y = \begin{cases} 3x - 10 & \text{if } x \geq \frac{10}{3} \\ -3x + 10 & \text{if } x < \frac{10}{3} \end{cases}$$



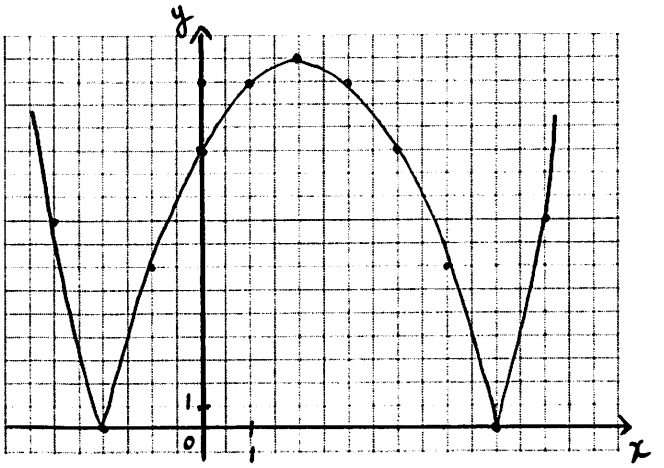
b) $y = |x^2 - 4x - 12|$

x	5	7	1
y	7	9	+15

vertex: $(2, -16)$

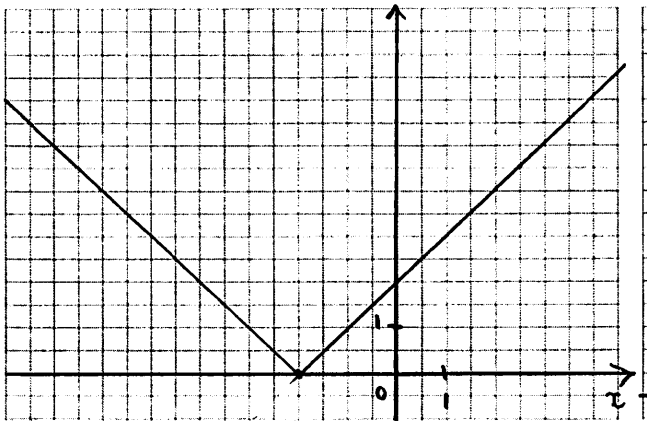
zeros: 6 & -2

$$y = \begin{cases} x^2 - 4x - 12 & \text{if } x \leq -2 \text{ or } x \geq 6 \\ -x^2 + 4x + 12 & \text{if } -2 < x < 6 \end{cases}$$



c) $y = |-x - 2|$

$$y = \begin{cases} -x - 2 & \text{if } x \leq -2 \\ x + 2 & \text{if } x > -2 \end{cases}$$



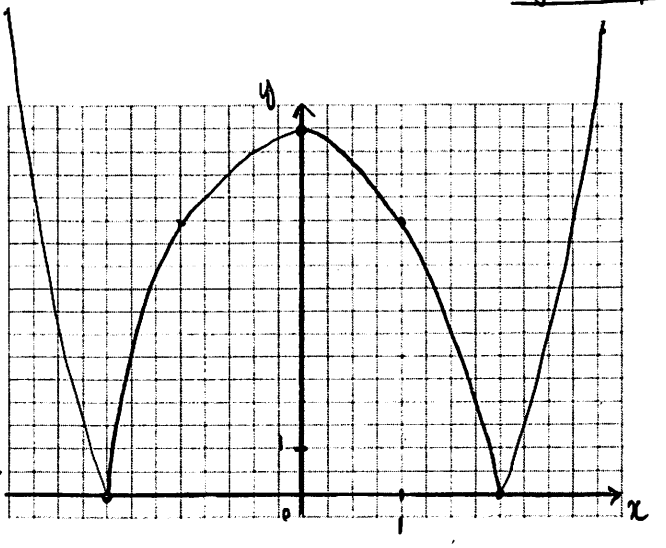
d) $y = |2x^2 - 8|$

$$y = \begin{cases} 2x^2 - 8 & \text{if } x \leq -2 \text{ or } x \geq 2 \\ -2x^2 + 8 & \text{if } -2 < x < 2 \end{cases}$$

vertex: $(0, -8)$

zeros: ± 2

x	1	3
y	6	10



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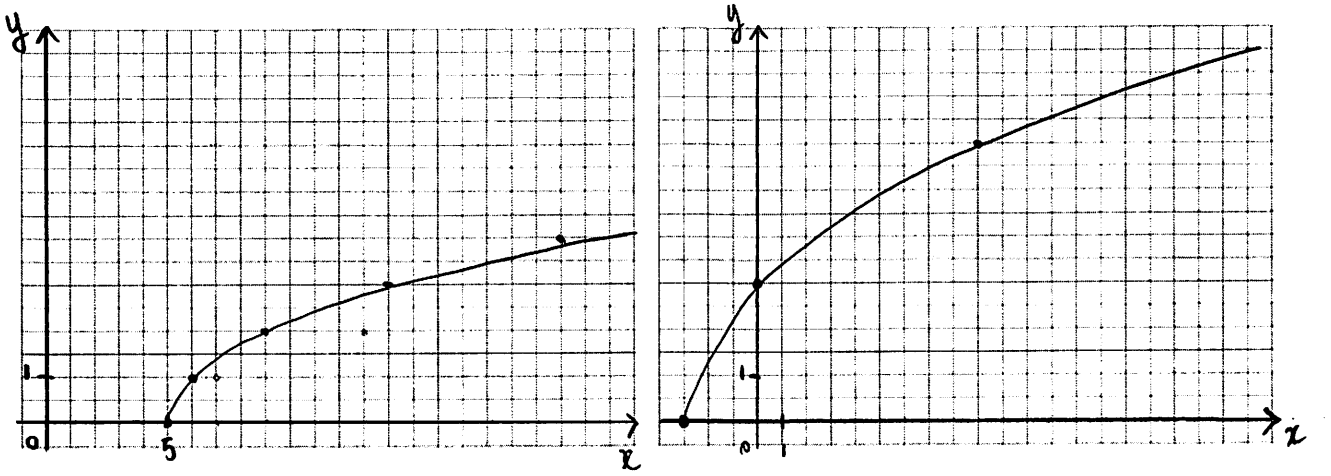
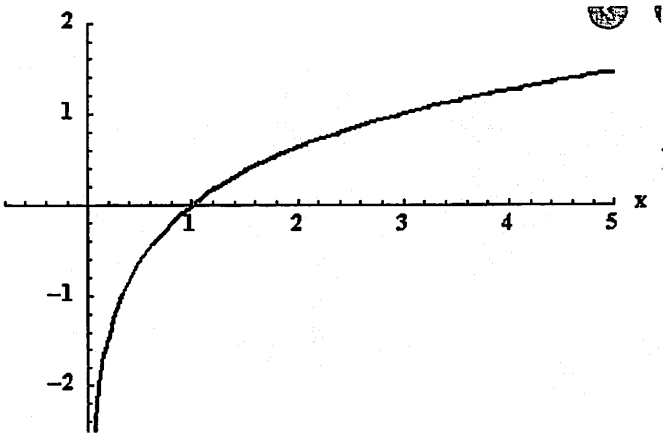
9. Graph: a) $y = \sqrt{x-5}$ b) $y = \sqrt{3x+9}$

$D = [5, +\infty)$ $D = [-3, +\infty)$

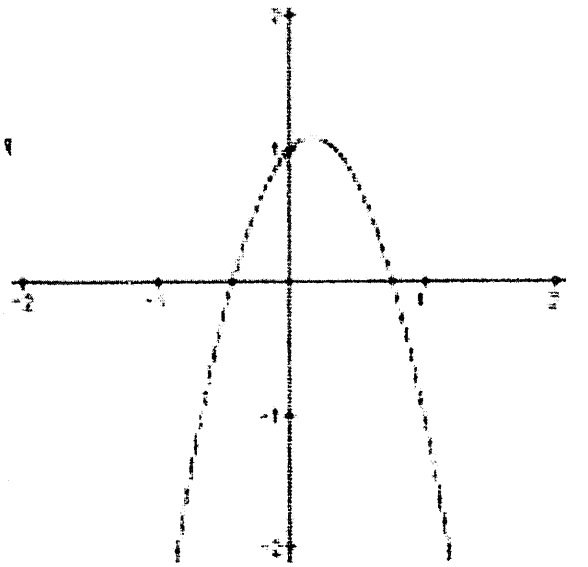


+ textbook #1 p 72

10. What type of function is this? (absolute value, linear, quadratic, square root, other)

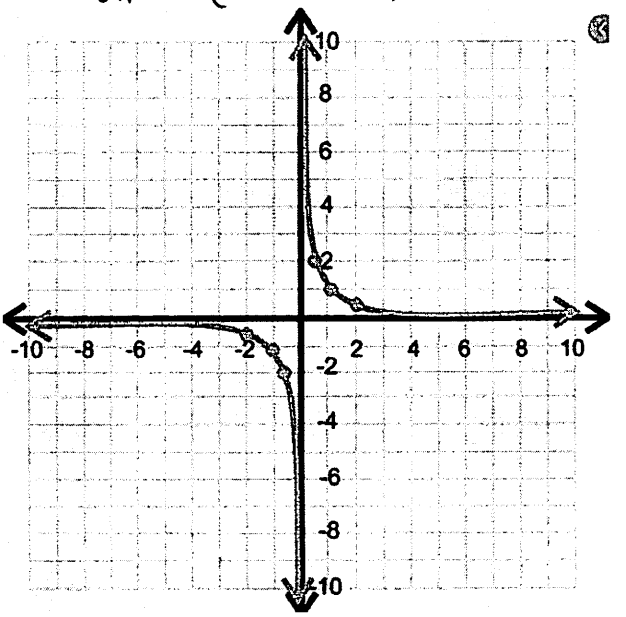


other (logarithm)

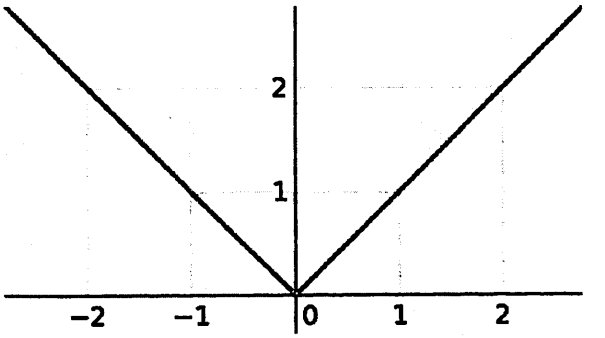


quadratic

other (rational)

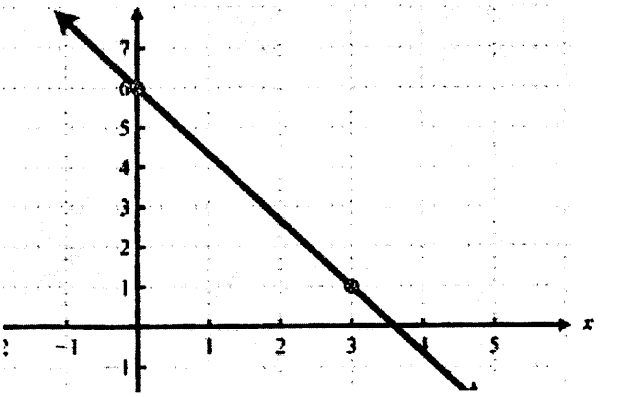


absolute value

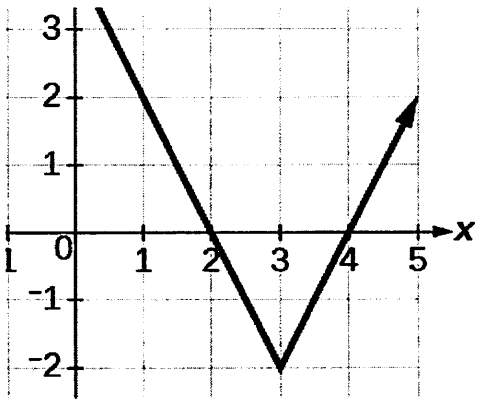


other (polynomial)

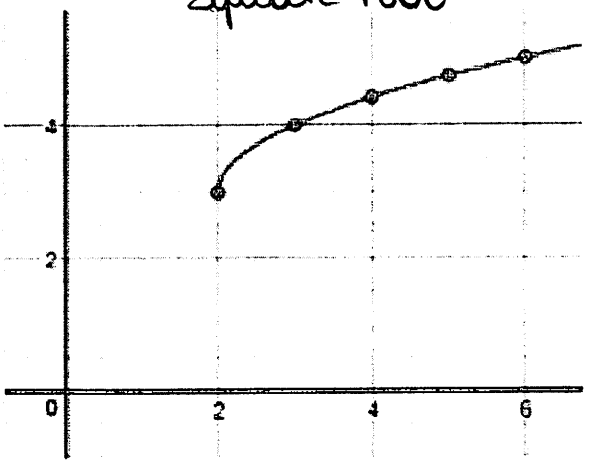
linear



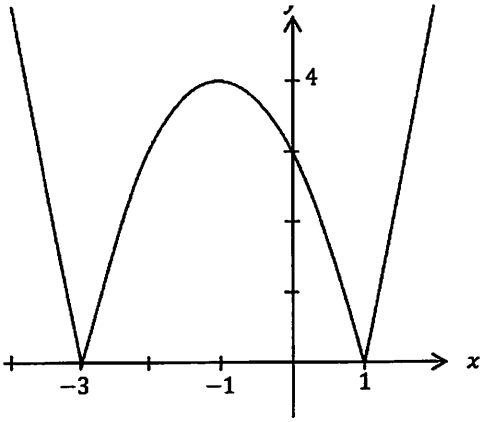
absolute value



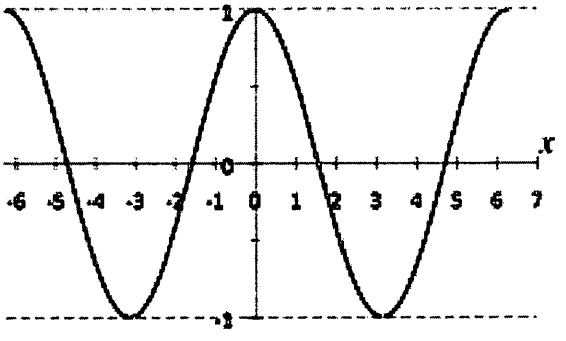
square root

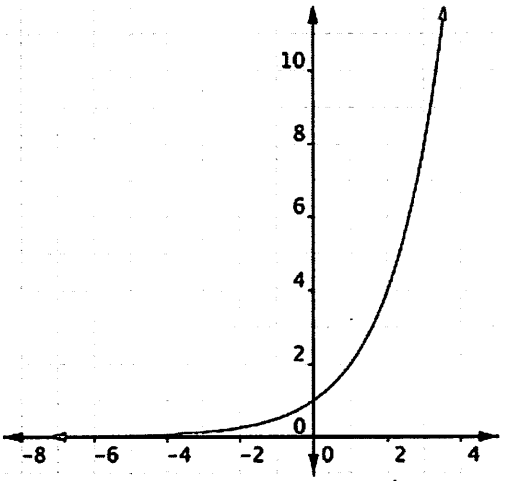


absolute value

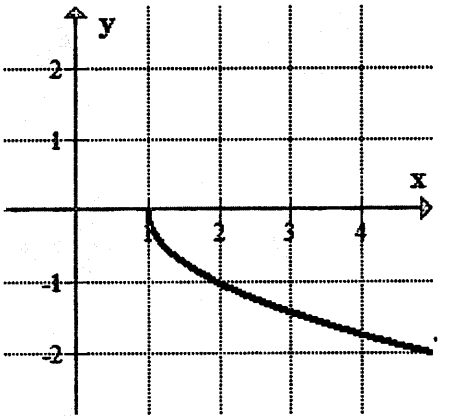


other (trigonometric)

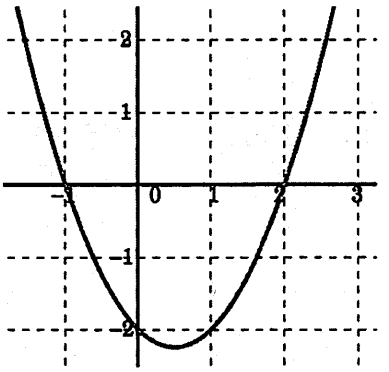




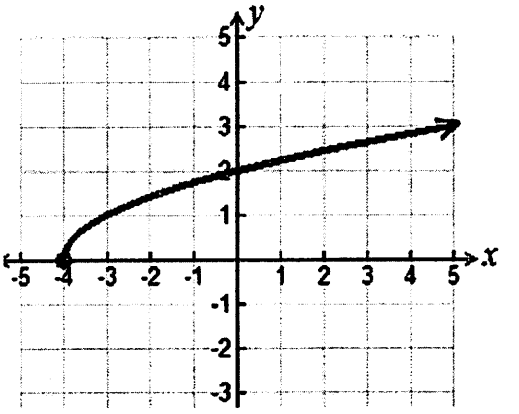
other (exponential)



square root



quadratic



square root.