Pg. 147

#7b) $y = -x^2 - 1$

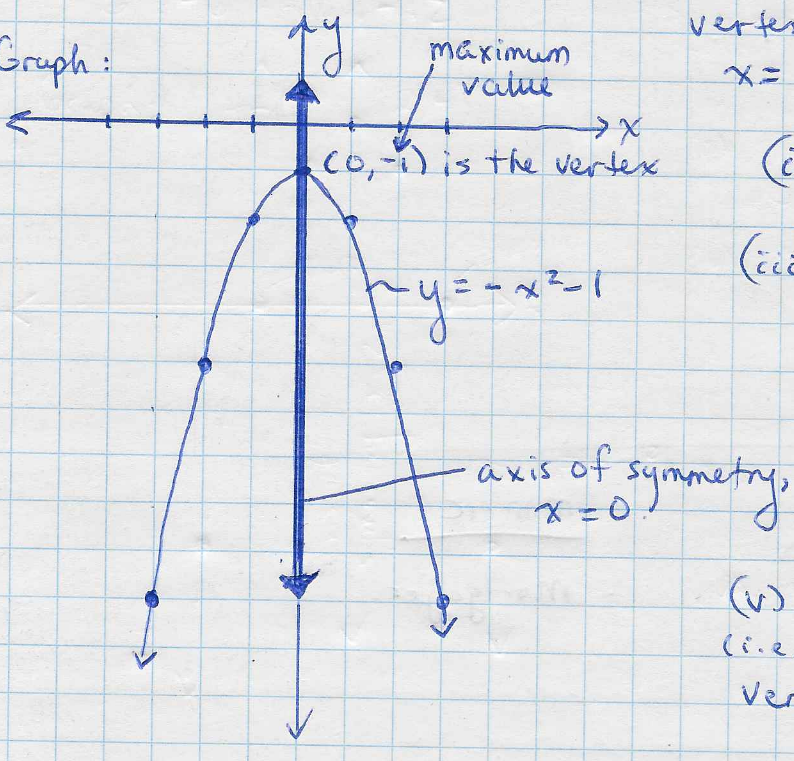
Table:

x	$-x^2-1$	y
-3	$-(-3)^2-1$	-10
-2	$-(-2)^2-1$	-5
-1	$-(-1)^2-1$	-2
0	$-(0)^2-1$	-1
1	-1^2-1	-2
2	-2^2-1	-5
3	-3^2-1	-10

(i) There's symmetry about the point, $(0, -1)$. This is the turning point, or vertex.

The equation for the axis of symmetry is $x =$ x-value for the coordinates of the vertex. In this case, $x = 0$.

Graph:



(ii) vertex: $(0, -1)$

(iii) y-int $= -1$

(iv) opening downwards, and with its maximum below the x-axis, there are <u>no</u> zeros.

(v) The maximum value (i.e, y-coordinate of the vertex) is $y = -1$.

p 147 # 7 d)

$y = -x^2 + 4x$

Table

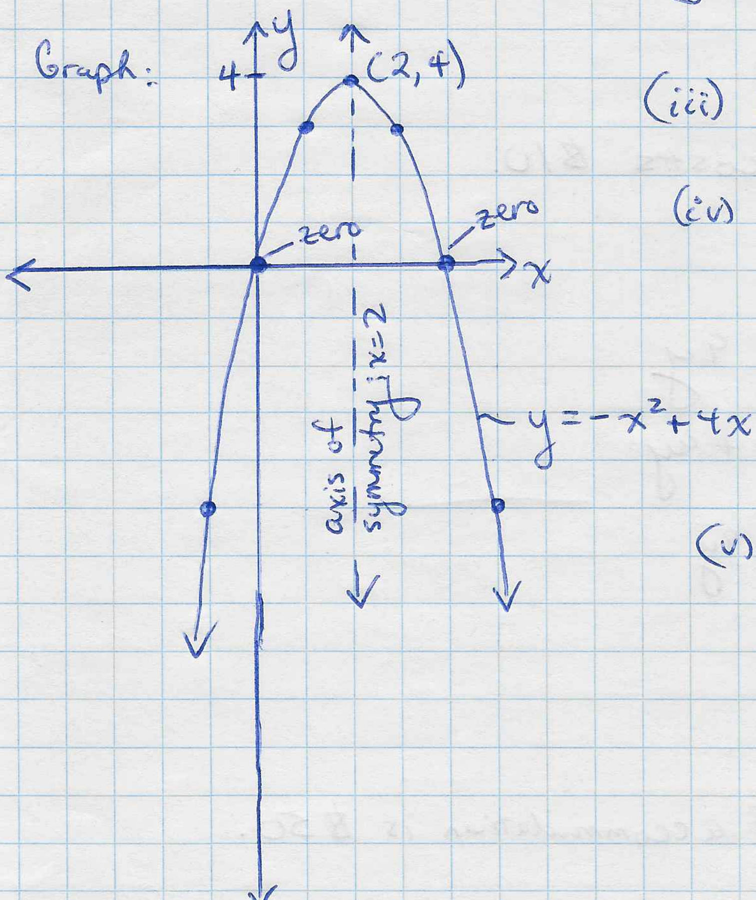
x	$-x^2+4x$	y
-3	$-(-3)^2+4(-3)$	-21
-2	$-(-2)^2+4(-2)$	-12
-1	$-(-1)^2+4(-1)$	-5
0	$-(0)^2+4(0)$	0
1	$-1^2+4(1)$	3
2	$-2^2+4(2)$	4
3	$-3^2+4(3)$	3
4	$-4^2+4(4)$	0
5	$-5^2+4(5)$	-5
6	$-6^2+4(6)$	-12

(i) Symmetry about $(2, 4)$.

(ii) Turning point, vertex, is $(2, 4)$

$\therefore$ $x = 2$ is the axis of symmetry.

Graph:



(iii) y-int $= 0$

(iv) zeros $= \underbrace{\{0, 4\}}$

'Braces' indicate a set, not an ordered pair.

(v) maximum : $y = 4$

p 147 # 10

$(-1, 41)$ and $(5, 41)$ lie on the parabola, $y = 4x^2 - 16x + 21$.

What are the coordinates of the vertex?

Solution:

Notice that $(-1, 41)$ and $(5, 41)$ both lie on the horizontal line, $y = 41$.

A.S

This means that the axis of symmetry lies in between both $(-1, 41)$ and $(5, 41)$.

Thus, $x = \dfrac{-1+5}{2} = 2$ is the A.S.

This x-value is also the x-coordinate of the vertex.

To determine y, set $x = 2$ in $y = 4x^2 - 16x + 21$ and solve.

$$\begin{aligned} y &= 4(2)^2 - 16(2) + 21 \\ &= 4(4) - 32 + 21 \\ &= 16 - 32 + 21 \\ &= -16 + 21 \\ &= 5 \end{aligned}$$

$\therefore (x, y) = (2, 5)$