MTHS100 - Assignment 7

Question 1

a) Is quadratic, concave up, y-intercept = (x - 5)^2 - 7
= x^2 - 2 * 5 + 25 -7
= x^2 - 10x + 18
y-intercept = 18
b) Is neither
c) Is a constant
d) Is neither
e) Is quadratic, concave down, y-intercept = - 2/3
f) Is quadratic, concave down, y-intercept = 0
g) Is quadratic, concave up , y-intercept = 0
h) Is linear, decreasing with a slope of - 1, y-intercept = 99

Question 2

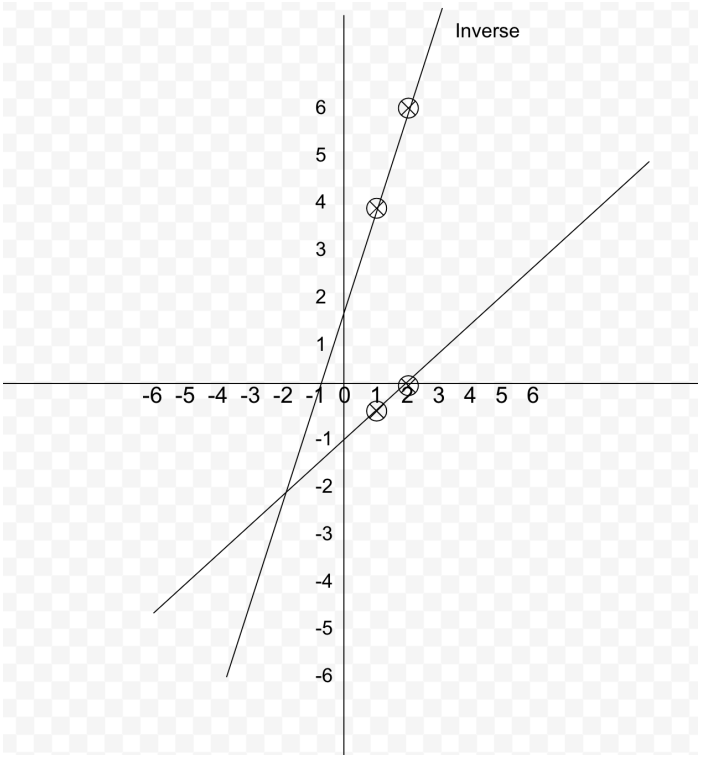
y = x/2 - 1

Where x = 1	Where x = 2
= 1/2 - 1	= 2/2 - 1
= 1/2 - 2/2	= 2/2 - 2/2
= - 1/2	= 0

Inverse

x = y/2 - 1
x + 1 = y/2
y = x * 2 + 1 * 2
y = 2x + 2

Where x = 1	where x = 2
= 2 * 1 + 2	= 2 * 2 + 2
= 4	= 6



Question 3

Find the slope:
m = y2 - y1 / x2 - x1
m = 4 - 1 / -3/2 - 3/2
m = 3 / -6/2 = -3/1
m = 3 / -3
m = -1

Solve for b:
For (3/2, 1)
1 = -1 * 3/2 + b
-b = -1 * 3/2 - 1
-b = -3/2 - 1
-b = -3/2 - 2/2
-b = -5/2

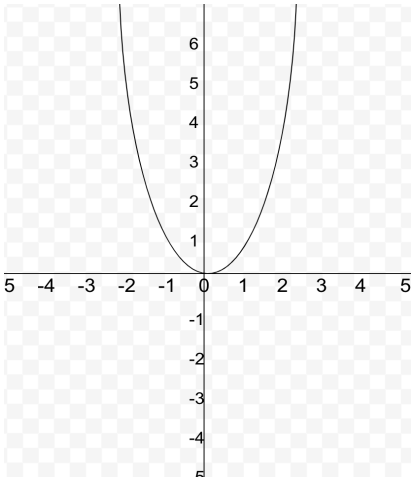
To get positive b, we times both sides by -1

b = 5/2

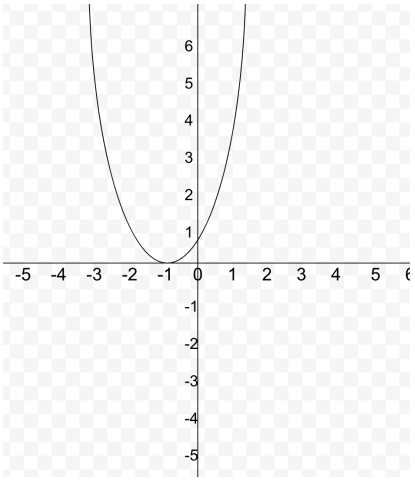
Final equation:
y =
-1x + 5/2

Check solution using coordinates: (3/2,1)
1 = -1 * 3/2 + 5/2
1 = -3/2 + 5/2
1 = 2/2
1 = 1

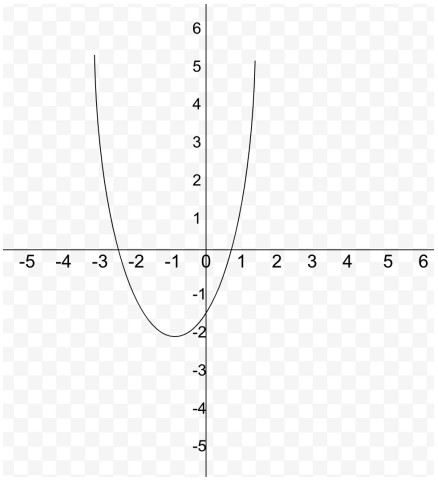
Question 4



a) y = x^2



b) y = (x +1)^2



c) y = (x + 1)^2 - 2

d) [-1, -2]

e) y = (x + 1)^2 - 2
= (x + 1)(x + 1) - 2
= x^2 +2x + 1 - 2
= x^2 + 2x - 1

Question 5

y = (x + 1)^2 is equal to y = x^2 +1. With the domain restricted to x >= -1 is invertible.

Inverse:
x = y^2 + 1
x - 1 = y^2
y = √x - 1

Question 6

Solve:
x^2 - 4x + 5 = 0

= -(-4)+/- √-4^2 - 4*1*5 / 2
= 4+/- √16 - 20 / 2
= 4 +/- √ -4 / 2

As we can't take the negative of a root, we can conclude that this parabola has not x's, meaning that it does not intercept the x axis. Since it has a positive x^2 we can also conclude it sits above the x-axis and opens concave up.

Find the vertex:

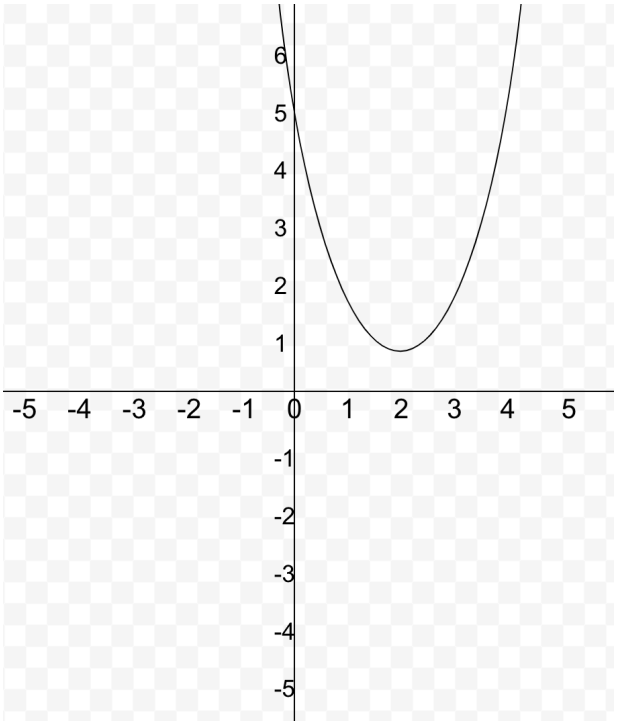
y-vertex = c - b^2 / 4a
= 5 - -4^2 / 4
= 5 - 16 / 4
= 5 - 4
= 1

x-vertex = - b^2/2a
= - -4/2
= - -2
= 2

x & y vertex's = (2, 1)

The vertex is the minimum of this function due to it having a positive x^2. It opens concave up.

Question 7



Question 8

y = - x^2 - 3x + 1

Since it has a negative x^2, we can conclude that this parabola is concave down

y intercept = 1

x intercept = -(-3)+/- √-3^2 - 4 * -1 * 1 / 2 * - 1
= 3+/- √ 13 / -2
= 3 + 3.6 / -2 & = 3 - 3.6 / -2
= 6.6 / -2 & = -0.6 / -2
= - 3.3 & = 0.3

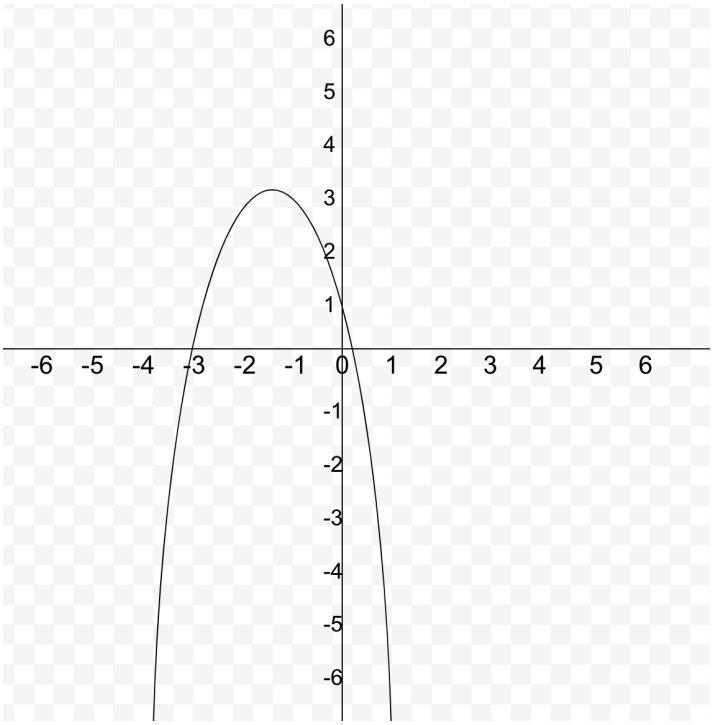
x intercepts = -3.3, 0.3

Find the vertex:

yv = c - b^2/ 4a
= 1 - 9 / -4
= 1 + 9/4
= 4/4 + 9/4
= 13/4
= 3 & 1/4

xv = -b/2a
= -(-3) / 2 * -1
= 3/-2
= -1 & 1/2

xv = -3/2 or -1 & 1/2, yv = 13/4 or 3 & 1/4



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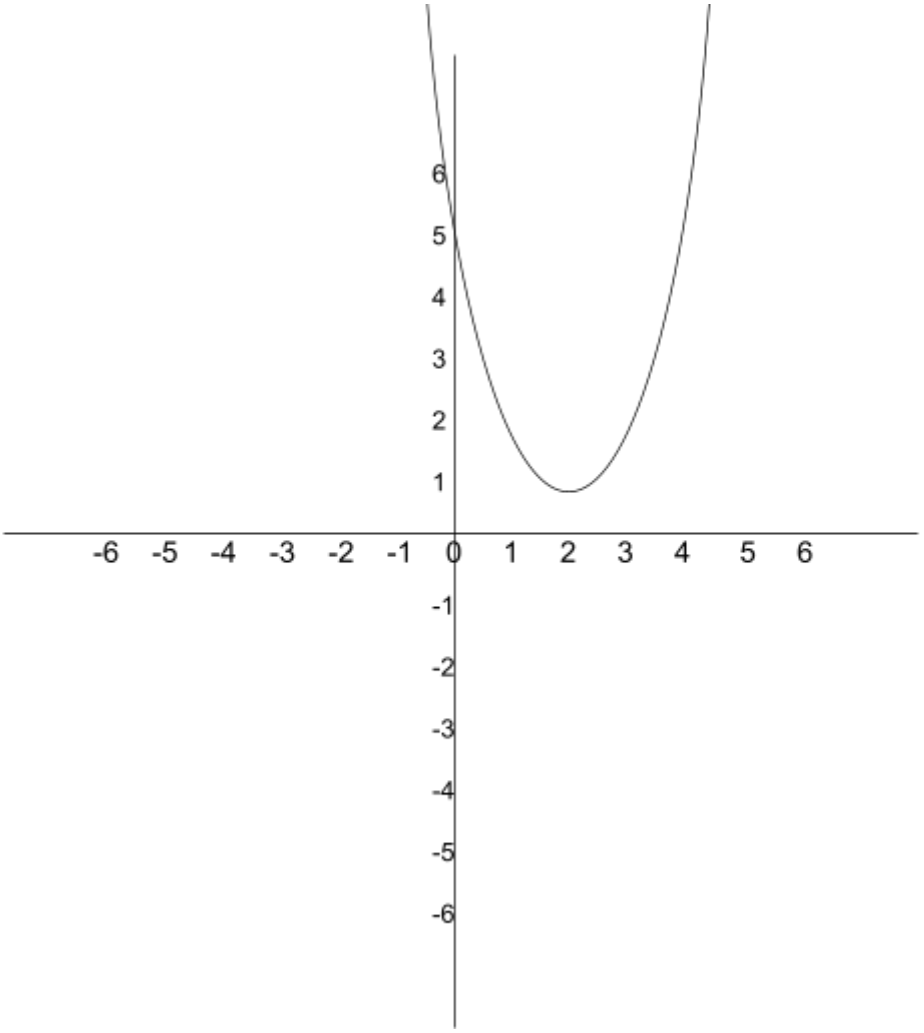
6
5
4
3
2
1
-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
-1
-2
-3
-4
-5
-6