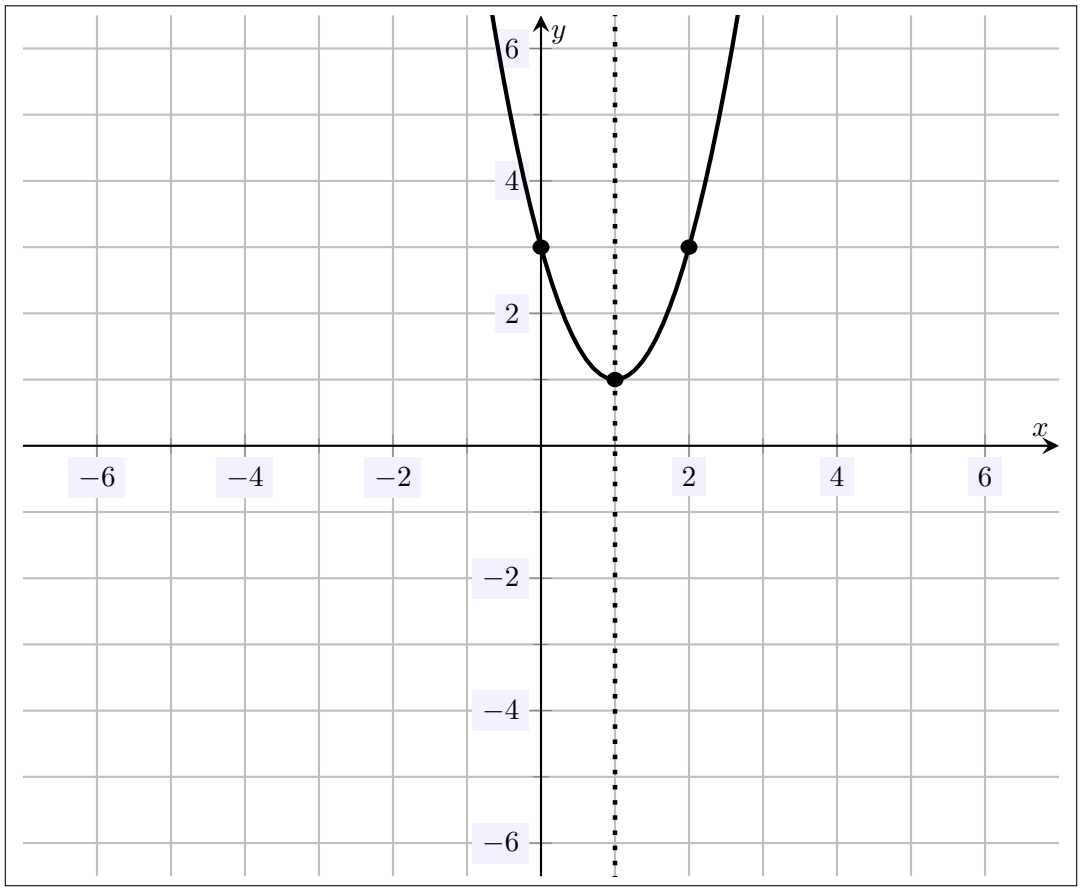
Name: *Caleb McWhorter — Solutions*
MATH 101
Fall 2021
HW 8: Due 10/29

"The world is a stage, but the play is badly cast."

– Oscar Wilde

Problem 1. (10pt) Plot the quadratic function $y = 2x^2 - 4x + 3$ as accurately as possible. Your sketch should include the vertex and axis of symmetry.



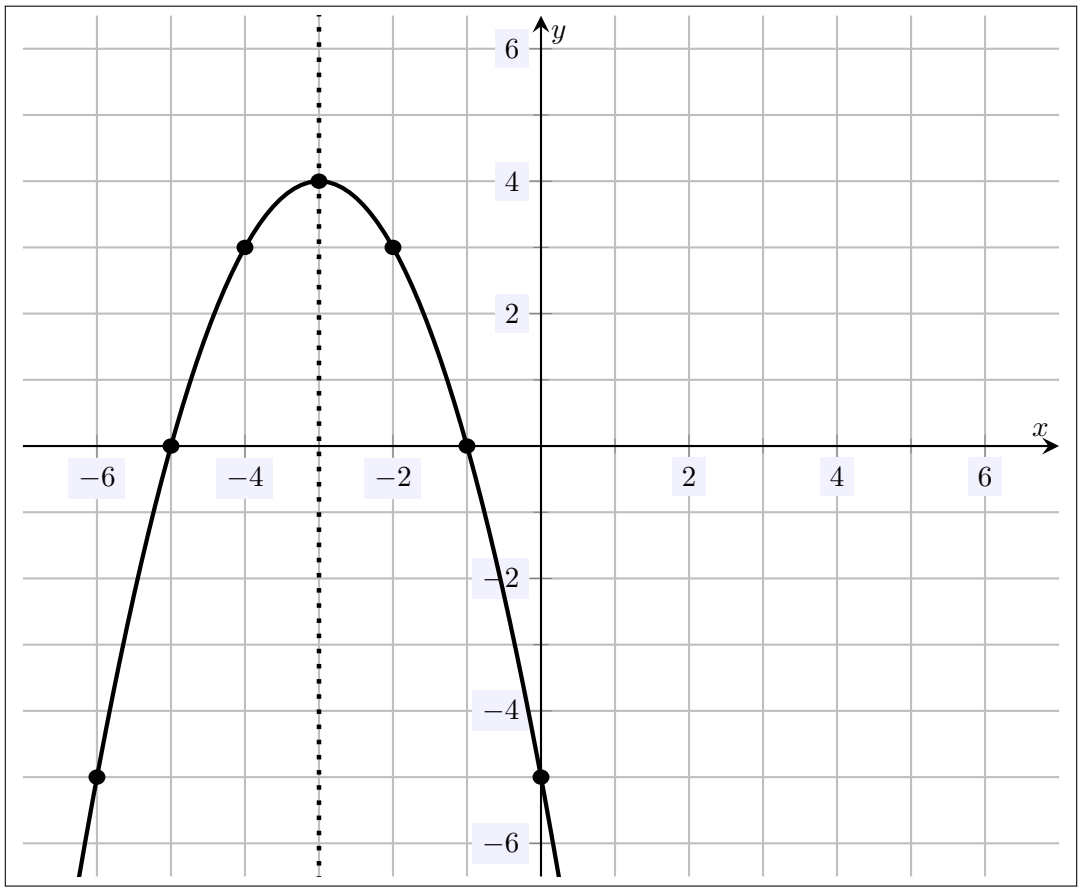
Because $a = 2 > 0$, the parabola opens upwards, i.e. is convex. The vertex occurs at $x = -\frac{b}{2a} = -\frac{-4}{2(2)} = 1$. We know

$$y(1) = 2(1^2) - 4(1) + 3 = 2 - 4 + 3 = 1$$

Therefore, the vertex is $(1, 1)$. We need to include this point. The axis of symmetry is $x = 1$. We find serval other points:

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	51	33	19	9	3	1	3	9	19

Problem 2. (10pt) Plot the quadratic function $y = -x^2 - 6x - 5$ as accurately as possible. Your sketch should include the vertex and axis of symmetry.



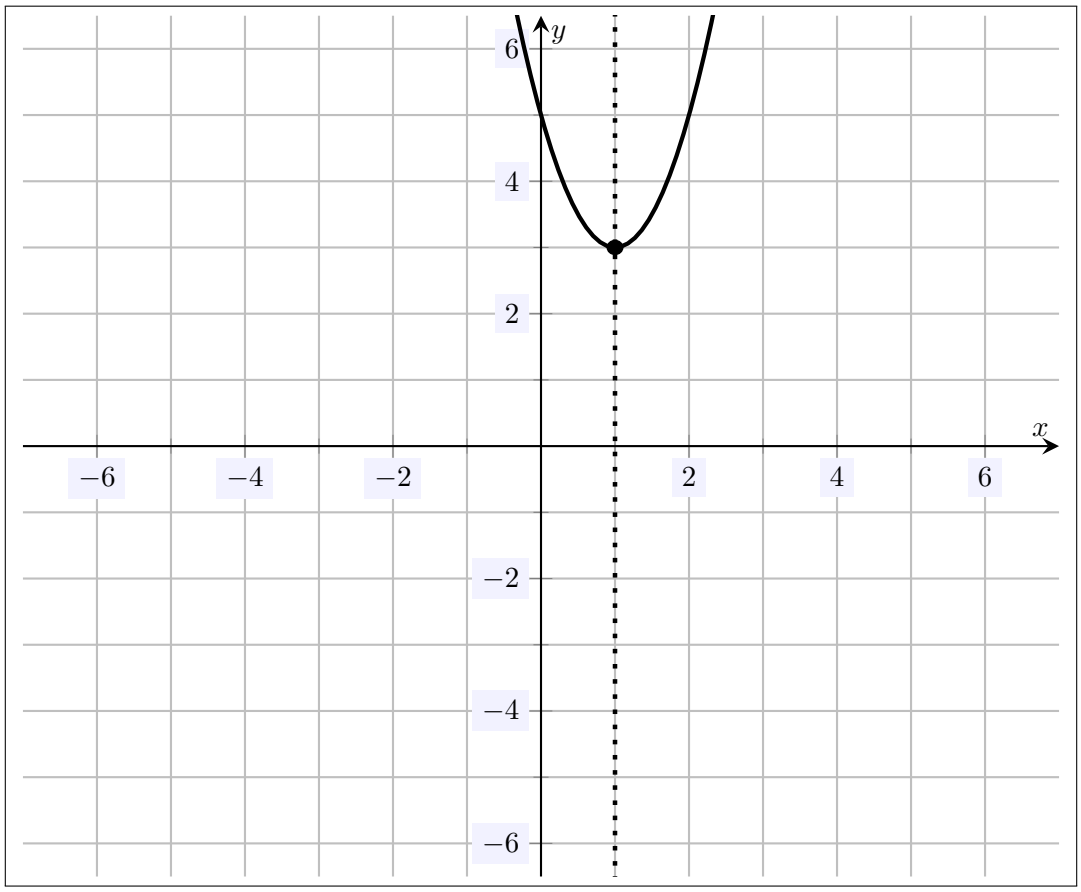
Because $a = -1 < 0$, the parabola opens downwards, i.e. is concave. The vertex occurs at $x = -\frac{b}{2a} = -\frac{-6}{2(-1)} = -3$. We know

$$y(-3) = -(-3)^2 - 6(-3) - 5 = -9 + 18 - 5 = 4$$

Therefore, the vertex is $(-3, 4)$. We need to include this point. The axis of symmetry is $x = 1$. We find serval other points:

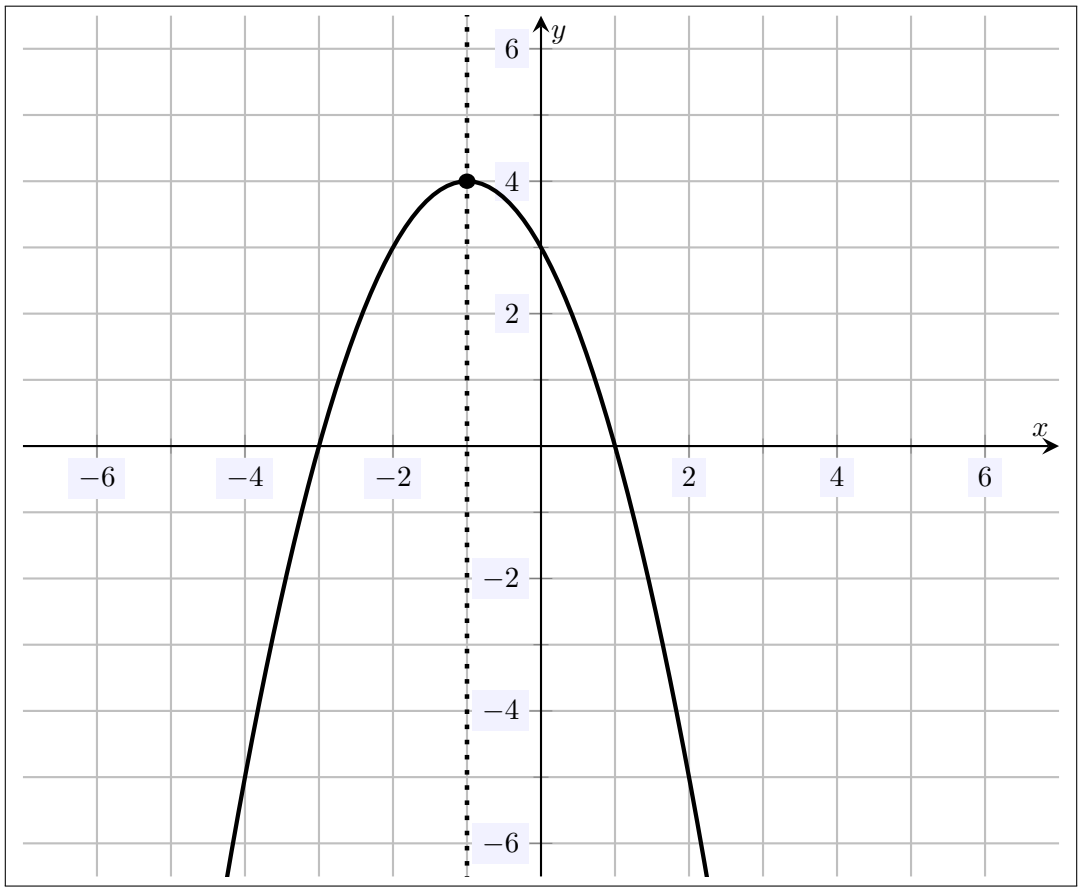
x	-7	-6	-5	-4	-3	-2	-1	0	1
$f(x)$	-12	-5	0	3	4	3	0	-5	-12

Problem 3. (10pt) Give a rough sketch of the quadratic function $y = 2(x-1)^2 + 3$. Your sketch should include the vertex and axis of symmetry.



Because $a = 2 > 0$, the parabola opens upwards, i.e. is convex. Because the parabola is in vertex form, we know the vertex is $(1, 3)$. Therefore, the axis of symmetry is $x = 1$.

Problem 4. (10pt) Give a rough sketch of the quadratic function $y = 4 - (x + 1)^2$. Your sketch should include the vertex and axis of symmetry.



Because $a = -1 < 0$, the parabola opens downwards, i.e. is concave. Because the parabola is in vertex form, we know the vertex is $(-1, 4)$. Therefore, the axis of symmetry is $x = -1$.