

# Math 02: Quiz 1

23 February

Name: Answer Key

This is the first quiz. There are 10 questions. Each is worth 10 points, for a total of 100.

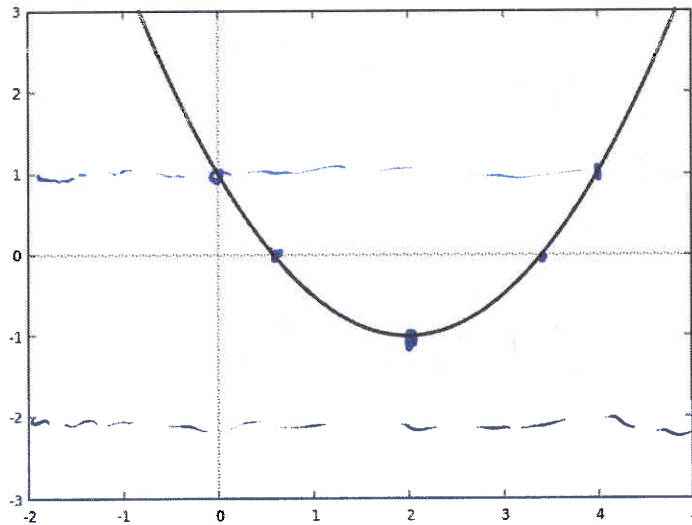
Carefully read each question and understand what is being asked before you start to solve the problem. Please show your work in an orderly fashion, and circle or mark in some way your final answers.

**No calculators nor other electronic devices are allowed.**

1		6	
2		7	
3		8	
4		9	
5		10	

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. A quadratic function  $f(x)$  is graphed below.



(a) How many x-intercepts does  $f(x)$  have?

2

(b) How many solutions are there to  $f(x) = 1$ ?

2

(c) How many solutions are there to  $f(x) = -2$ ?

0

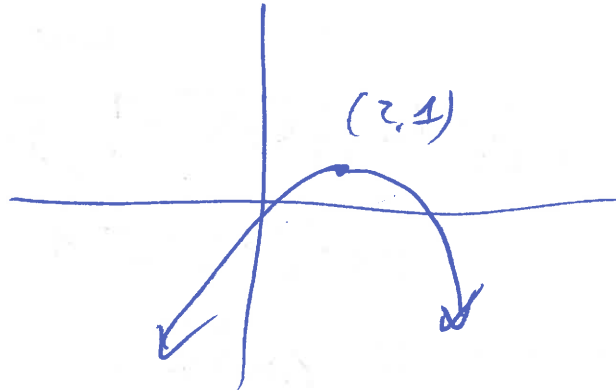
(d) What is the vertex of  $f(x)$ ?

$(2, -1)$

2. Find the vertex of the following quadratic function and sketch a graph. Identify the vertex on your graph.

$$y = -\frac{1}{2}(x - 2)^2 + 1$$

vertex: (2, 1)

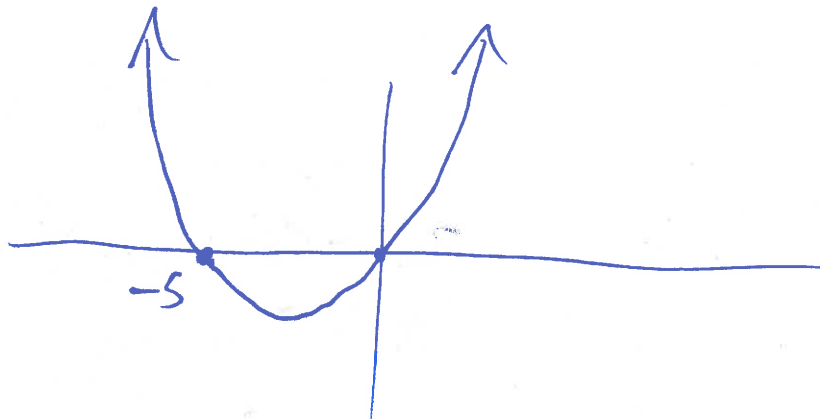


3. Find the x-intercepts of the following quadratic function and sketch a graph.

$$y = 2x^2 + 10x$$

$$y = 2x(x + 5)$$

intercepts:  $x = 0$  or  $x = -5$



4. Simplify the following expression. Your final answer should have no perfect squares inside the square root.

$$\sqrt{8400}$$

Here's the prime factorization of 8400:

$$8400 = 2^4 \times 3 \times 5^2 \times 7 = \underbrace{2 \times 2 \times 2 \times 2}_{2^4} \times 3 \times \underbrace{5 \times 5}_{5^2} \times 7$$

$$\begin{aligned}\sqrt{8400} &= \sqrt{2^2 \cdot 2^2 \cdot 5^2 \cdot 3 \cdot 7} \\ &= 2 \cdot 2 \cdot 5 \cdot \sqrt{3 \cdot 7} \\ &= \underline{20\sqrt{21}}\end{aligned}$$

5. Rewrite the following expression to have no square roots in the denominator.

$$\frac{2}{\sqrt{3}}, \frac{\sqrt{3}}{\sqrt{3}} = \underline{\underline{-\frac{2\sqrt{3}}{3}}}$$

6. Find all solutions to the equation

$$2x^2 - 7 = 11.$$

$$2x^2 = 18.$$

$$x^2 = 9$$

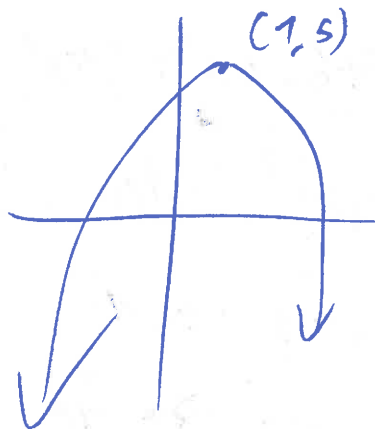
$$\underline{\underline{x = \pm 3}}$$

7. Find the vertex of the following function. Sketch a graph, marking the vertex on the graph.

$$y = -x^2 + 2x + 4$$

vertex:  $x = \frac{-2}{-2} = 1$

$$\begin{aligned} y &= -(1)^2 + 2(1) + 4 \\ &= -1 + 2 + 4 \\ &= 5 \end{aligned}$$



8. Find all solutions to the following equation. You do not have to fully simplify square roots.

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

$$(x + 3)^2 = 7$$

$$x + 3 = \pm\sqrt{7}$$

$$x = -3 \pm \sqrt{7}$$

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9. Solve the following equation by completing the square. You do not have to fully simplify square roots.

$$x^2 + 6x = 1$$

$$\underbrace{x^2 + 6x + 3^2 = 1 + 3^2}$$

$$(x+3)^2 = 10$$

$$x+3 = \pm\sqrt{10}$$

$$\underline{x = -3 \pm \sqrt{10}}$$

10. Solve the following equation by using the quadratic formula. You do not have to fully simplify square roots.

$$x^2 + 6x = 1$$

$$x^2 + 6x - 1 = 0$$

$$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(-1)}}{2}$$

$$= \frac{-6 \pm \sqrt{36+4}}{2}$$

$$\underline{x = -3 \pm \frac{\sqrt{40}}{2}}$$

$$x = -3 \pm \frac{2\sqrt{10}}{2}$$

$$= -3 \pm \sqrt{10}$$

Either is fine

11. Extra Credit (up to +5): I am a positive number so that squaring me is the same as adding one to me. Who am I?

If I am  $x$ ,

$$x^2 = x + 1$$

$$x^2 - x - 1 = 0$$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-1)}}{2}$$

$$= \frac{1 \pm \sqrt{5}}{2}$$

$1 - \sqrt{5}$  is negative

So I am  $\frac{1 + \sqrt{5}}{2}$

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(Extra space. Label which question the work is for.)