Math 48A, Lesson 15: Quadratic Functions

1. Find the Standard Form of a Quadratic Function

Consider the standard form for a quadratic function:

Put each of functions below in standard form. In other words, specifically identify the values of , , and .

1A. 1D.

1B. 1E. k

1C.

2. Explore the Standard Form of a Quadratic Function

Consider the standard form for a quadratic function:

Using simple language, identify the role of each individual part of this function. Do your best to come up with descriptions for each of the following: , , , , and .

3. Explore the anatomy of perfect-square trinomials

Expand each of the following perfect squares and write as a trinomial in the form

.

Show your steps and specifically identify values for coefficients and . The first one is done for you.

3A.

Let’s consider the perfect square :

3B.

3C.

3D.

4. For each of the problems above, write the equivalent expressions in the form

Then, specifically identify the values of the coefficients and . The first one is done for you.

4A.

We notice from our work on problem 3A above that we have:

4B.

4C.

4D.

5. Look back on the work you finished in problem 4 above. What pattern do you notice? Specifically, how are the coefficients and related to each other? Make a conjecture about how this will work in general.

6. Your definition of a perfect square trinomial

We say that a perfect-square trinomial is a three-term expression that can be factored as a perfect square. We’ve seen this in our work in problems 1 – 5. Below is a diagram that shows the connection:

Diagram

Description automatically generated with medium confidence

Come up with your own description for a perfect-square trinomial. Use simple, abuelita language and make this as clear as you can for yourself.

7. LEARN TO COMPLETE THE SQUARE

Consider each incomplete expression below. Add a constant to make the expression a perfect-square trinomial. Then write the factored form of the expression as a perfect square. Identify each step you take in the solution. Please make sure you can explain to yourself why you are taking each step.

7A.

7B.

7C.

7D.

7E.

8. GENERATE THE VERTEX FORM FOR A QUADRATIC FUNCTION

Use the method of completing the square (from problems 1 – 7) to transform the quadratic function in standard form into an expression that contains a perfect square

8A. 8B.