The AC Method

Part 1

How to be able to tell when a polynomial isn’t factorable when trying to solve

1. **Make a list of the coefficients**

**a =**

**b =**

**c =**

A common source of error is to start with the wrong coefficients, particularly with negative numbers. For example,

has

a = 3,

b = 1, and

c = 5.

1. **Find ac.**

In our example above, ac = 3\*(-5)= -15.

1. **List the factor pairs of ac, in order.**

Continuing with our example, we would write

**-15**

|  |  |
| --- | --- |
| 1 | -15 |
| -1 | 15 |
| 3 | -5 |
| -3 | 5 |

1. **Add the factor pairs to see which, if any, add up to b. If none do, the polynomial is not factorable. If a factor pair does sum up to b, proceed to Step 5.**

In the list above, we would have a 3rd column of the sums of the factor pairs:

**-15**

|  |  |  |
| --- | --- | --- |
| 1 | -15 | -14 |
| -1 | 15 | 14 |
| 3 | -5 | -2 |
| -3 | 5 | 2 |

Since none of the factor pairs adds up to b = -1 , we know the polynomial in our example,

is **irreducible or non-factorable**.

[To solve the equation , another method (say, completing the square) will have to be used.]

Part 2

How to factor a **factorable** quadratic using the AC-Method.

1. **Make a list of the coefficients**

**a =**

**b =**

**c =**

For example,

has

a = 6,

b = 1, and

c = 12.

1. **Find ac.**

In this example, ac = 6\*(-12)= -72.

1. **List the factor pairs of ac, in order.**

Continuing with our example, we would write

**-72**

|  |  |
| --- | --- |
| 1 | -72 |
| -1 | 72 |
| 2 | -36 |
| -2 | 36 |
| 3 | -24 |
| -3 | 24 |
| 4 | -18 |
| -4 | 18 |
| 6 | -12 |
| -6 | 12 |
| 8 | -9 |
| -8 | 9 |

1. **Add the factor pairs to see which, if any, add up to b.**

If none do, the polynomial is not factorable.

If a factor pair does sum up to b, the polynomial **IS** factorable and you go on to Step 5.

Using the list above, we could add a 3rd column of the **sums** of the factor pairs:

**-72 Sums**

|  |  |  |
| --- | --- | --- |
| 1 | -72 | -71 |
| -1 | 72 | 71 |
| 2 | -36 | -34 |
| -2 | 36 | 34 |
| 3 | -24 | -21 |
| -3 | 24 | 21 |
| 4 | -18 | -14 |
| -4 | 18 | 14 |
| 6 | -12 | -6 |
| -6 | 12 | 6 |
| 8 | -9 | -1 |
| -8 | 9 | 1 |

In our polynomial, has b = 1.

In the shaded row in the table above, we see that 8 and -9 have sum = -1.

We will use these two numbers in the next step.

1. **Rewrite the polynomial equation, replacing “b” with the sum of those two factors just found.**

In the current example, we would write

1. **Factor this polynomial now using “factoring by grouping.”**

In this example we would get

By factoring out the common “,” we would then have

We have now successfully factored the original polynomial equation.

1. **Use the Zero Factor Principle (ZFP) to solve the equation.**

Here, that would mean we would then solve the 2 linear equations,

These have solutions