Math 131 Review
Factoring Trinomials of the form ax^2+bx+c

Method 1 – Trial and Error to factor trinomials of the form ax^2+bx+c.
First factor out GCF. If the leading term is negative, it is usually a good idea to factor out the negative.

Prepare the factors using the pattern of signs. If the third term in the trinomial is negative, it tells us that one of the factors has a + sign and the other has a -. If the third term is positive, this tells us that both our factors have the same sign, both + or both -. Which it is can be determined by looking at the sign of the second term.
EX. Pattern of Signs:

$6x^2+5x-4$ will break down into $(\_\_x + \_\_)(\_\_x - \_\_)$
$6x^2-19x+10$ will break down into $(\_\_x - \_\_)(\_\_x - \_\_)$
$8x^2+34x+35$ will break down into $(\_\_x + \_\_)(\_\_x + \_\_)$

The product of the first two terms ("F" in FOIL) must yield the leading term of the trinomial, so consider all factor pairs of "a" for the first terms of the factors. The product of the second two terms ("L" in FOIL) must yield the third term of the trinomial, so consider all factor pairs of "c" for the second two terms of the factors. By considering these combinations, you are assured of getting the first and last term of the trinomial, the challenge is to also get the middle term. By multiplying, specifically by multiplying the outer and inner terms ("OI" in FOIL), determine which of these combinations, if any, produces the correct middle term.

Ex. Factor $6x^2+5x-4$ We determined that the factors will take on the form: $(\_\_x + \_\_)(\_\_x - \_\_)$
Factors of 6 are 1&6 or 2&3, so the possibilities for the first terms are

$(x + \_\_)(6x - \_\_)$ or, with signs switched $(x - \_\_)(6x + \_\_)$
$(2x + \_\_)(3x - \_\_)$ or, with signs switched $(2x - \_\_)(3x + \_\_)$

Now, the second terms have to be factors of 4, so 1&4 or 2&2. This gives the possibilities:

1&4: $(x + 1)(6x -4)$ or $(x + 4)(6x -1)$ $(x - 1)(6x + 4)$ or $(x -4)(6x + 1)$
$(2x +1)(3x - 4)$ or $(2x +4)(3x - 1)$ $(2x -1)(3x + 4)$ or $(2x-4)(3x+1)$

2&2 $(x + 2)(6x -2)$ $(x - 2)(6x +2)$
$(2x + 2)(3x -2)$ $(2x - 2)(3x + 2)$

These are all the possibilities which yield $6x^2+\_\_\_ -4$. Now just check to see which, if any yields 5x for the middle term.

Time Saving Strategies:

If the original trinomial has no GCF then the factors will have no GCF so we can eliminate all possibilities where the factors have a GCF.

When checking for the middle term, if we get the opposite of what we need, just switch the signs.

When mastered, this method is usually quicker than the other method. In practice, we don't write out all the possibilities, but instead keep track mentally.
Try the trial and error method to factor:

$6x^2-19x+10$ $8x^2+34x+35$

Method 2- Rewriting the middle term and grouping.
In general, my opinion is that this method is not as quick and it is more "mysterious", but some students prefer this method.

Again, the first step is to factor out the GCF,

To factor ax^2+bx+c , find two numbers whose product is "ac" and whose sum is "b". Use these numbers to rewrite the middle term, bx. Factor by grouping.

Example: $6x^2+5x-4$
In this problem, a = 6, b=5 and c = -4. Find two numbers whose product is ac = -24 and whose sum is b = 5.

Number pairs whose product is -24:

			product	sum
1	-24		-24	-23
-1	24		-24	23
2	-12		-24	-10
-2	12		-24	10
3	-8		-24	-5
-3	8		-24	5
4	-6		-24	-2
-4	6		-24	2

The pair that works here is -3 and 8. So rewrite
$6x^2+\underline{5x}-4$
$6x^2+\underline{-3x+8x}-4$. Now factor by grouping.

$3x(2x-1)+4(2x-1)$
$(3x+4)(2x-1)$

Try this method to factor:
$6x^2-19x+10$ $8x^2+34x+35$