3.5 Factoring $x^2 + bx + c$

A trinomial can be factored if a certain set of criteria exists. Consider expanding:

(x + 2)(x + 3)

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

$= x^2 + 5x + 6$

Now consider breaking up trinomials into factors

ex. $x^2 + 5x + 6$

$\underline{2} \cdot \underline{3} = 6$

$\underline{2} + \underline{3} = 5$

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

ex. $x^2 + 3x - 10$

$\underline{5} \cdot \underline{-2} = -10$

$\underline{5} + \underline{-2} = 3$

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

****We are always looking for factors of c that have a sum of b*

Try the following examples

a) $x^2 + 10x + 21$

$\underbrace{(x+3)(x+7)}_{10x}$ ✓

b) $x^2 - x - 20$

$\underline{-5} \cdot \underline{4} = -20$

$\underline{-5} + \underline{4} = -1$

$= (x-5)(x+4)$

c) $x^2 - 11x + 28$

$\underline{-4} \cdot \underline{-7} = 28$

$\underline{-4} + \underline{-7} = -11$

$= (x-4)(x-7)$

d) $x^2 + 5x - 6$

$\underline{6} \cdot \underline{-1} = -6$

$\underline{6} + \underline{-1} = 5$

$= (x+6)(x-1)$

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