Completely Factoring Cubics

There are only two possibilities. Either a completely factored cubic will have 3 linear factors, or it will have 1 linear factor and 1 quadratic factor with no roots.

Either way, there will be at least 1 linear factor, so the cubic will have at least one root. (That's important.)

Three Steps for factoring cubics

① Find a root of the cubic. Start by checking the factors of its degree 0 coefficient.

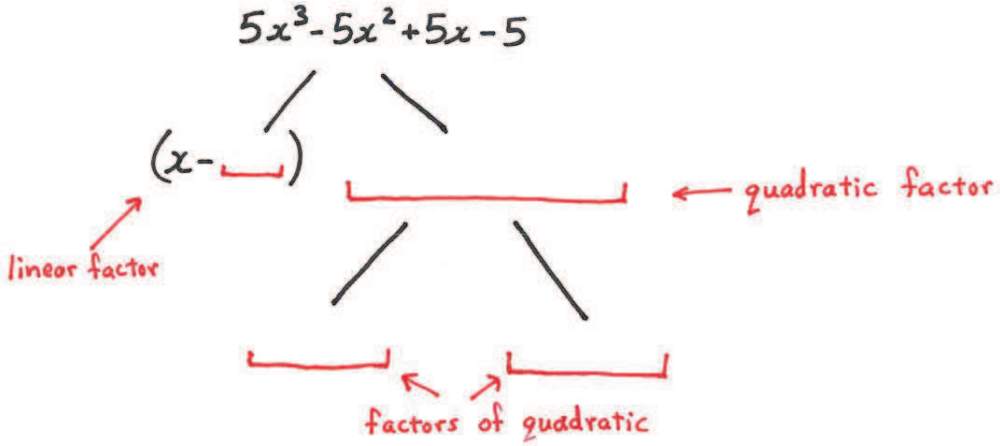
② After finding a root, α, divide the cubic by the factor $x-\alpha$ to find a quadratic factor.

③ Completely factor the quadratic.

Example: $5x^3-5x^2+5x-5$

Step ①: Degree 0 coefficient of the cubic is ____, whose factors are ____, ____, ____, and ____. Check these four numbers to see which is a root of the cubic. The root is ____.

Step ②: In the previous step, you found a root of the cubic, so you know that $x-$____ is a factor. Find the quadratic $\dfrac{5x^3-5x^2+5x-5}{x-\text{____}}$



Step ③: The discriminant of the quadratic is _____, so the quadratic has ____ roots, and its completely factored form is _____. Thus, completely factored,

$5x^3-5x^2+5x-5 =$ _____.