Factoring the Difference of Perfect Squares

$a^2 - b^2 = (a + b)(a - b)$

Sum of Perfect Squares: Doesn't Factor!

Factoring the difference of perfect cubes:

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Factor this: $\sqrt[3]{64c^3 - 27} = (4c - 3)((4c)^2 + (4c)(3) + (3)^2)$

$a = 4c$ $= (4c - 3)(16c^2 + 12c + 9)$

$b = 3$

Unlike the sum of perfect squares, there IS a way to factor the sum of perfect cubes.

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Factor the following:

1. $125a^3 + 343 = (5a + 7)(25a^2 - 35a + 49)$

$a = 5a$

$b = 7$

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Factor: 2. $27b^3 + 8c^3 = (3b + 2c)(9b^2 - 6bc + 4c^2)$

$a = 3b$ $b = 2c$

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

factor this: $3000g^6 + 3h^{15} = 3(10g^2 + h^5)(100g^4 - 10g^2h^5 + h^{10})$

$3(1000g^6 + h^{15})$

$a = 10g^2$

$b = h^5$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

These Quadratics are NEVER factorable.

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

When solving with the sum or difference of perfect cubes by factoring one solution will come from the first factor, (a - b) or (a + b)

The other two solutions will come from the quadratic factor $(a^2 + ab + b^2)$ or $(a^2 - ab + b^2)$

But, since it isn't factorable you will always need to use the Quadratic Formula.

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Find ALL Exact Complex solutions .

$x^3 + 8 = 0 \Rightarrow (x+2)(x^2 - 2x + 4)$

$a = x$

$b = 2$

$x = \frac{2 \pm \sqrt{-12}}{2}$ 4.3

$\frac{2 \pm 2i\sqrt{3}}{2}$

$x = -2, 1 \pm i\sqrt{3}$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Find ALL Exact Complex solutions .

$27x^3 - 1 = 0 \longrightarrow (3x-1)(9x^2+3x+1)=0$

$a = 3x$

$b = 1$

$\frac{-3 \pm \sqrt{-27}}{18}$ 9.3

$\frac{-3 \pm 3i\sqrt{3}}{18}$

$x = \frac{1}{3}, \frac{-1 \pm i\sqrt{3}}{6}$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Find ALL Exact Complex solutions .

$250x^4 - 128x = 0$

$2x(125x^3 - 64)=0$

$a = 5x \quad b = 4$

$0 = 2x(5x-4)(25x^2+20x+16)$

$\frac{-20 \pm \sqrt{-1200}}{50}$

$\frac{-20 \pm 20i\sqrt{3}}{50}$

$x = 0, \frac{4}{5}, \frac{-2 \pm 2i\sqrt{3}}{5}$

You can now finish Hwk #28: Sec 6-4

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Problems: 13, 14, 16, 18, 19, 44, 45