

February 6, 2017

MCV4U - Calculus and Vectors

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Welcome !!

DESMOS

Introduction to Calculus

Calculus is the study of change.

Factoring Special Trinomials

a) $x^3 - 64$

$f(a) = 0$ means $(x - a)$
is a factor

$f(4) = 0$ means $x - 4$ is
a factor

$$\begin{array}{r} x^2 + 4x + 16 \\ \hline x - 4 \overline{) x^3 + 0x^2 + 0x - 64} \\ \underline{-(x^3 - 4x^2)} \\ 4x^2 + 0x \\ \underline{-(4x^2 - 16x)} \\ 16x - 64 \\ \underline{-(16x - 64)} \\ 0 \end{array}$$

OR

$$x^3 - 64 = (x - 4)(x^2 + 4x + 16)$$

$$b) 2x^4 + 250x$$

$$= 2x(x^3 + 125)$$

$f(-5) = 0$ $(x + 5)$ is a factor

$$\begin{array}{r|rrrr} -5 & 1 & 0 & 0 & 125 \\ & & -5 & 25 & -125 \\ \hline & 1 & -5 & 25 & 0 \end{array}$$

$$= 2x(x+5)(x^2-5x+25)$$

Proving The Difference of Cubes

$$x^3 - y^3$$

$$f(x) = 0 \quad f(y) = 0$$

$(x - y)$ is a factor

$$\begin{array}{r}
 \quad \quad \quad x^2 + xy + y^2 \\
\hline
x-y \sqrt{ } \\
- (x^3 - x^2y) \quad \downarrow \\
\hline
 \quad \quad \quad x^2y + 0xy^2 \\
- (x^2y - xy^2) \quad \downarrow \\
\hline
 \quad \quad \quad xy^2 - y^3 \\
- (xy^2 - y^3) \\
\hline
 \quad \quad \quad 0
\end{array}$$

$$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$

$$c) 8x^3 - 343$$

$$= (2x - 7)(4x^2 + 14x + 49)$$

$$d) 10x^4 - 270xy^3$$

$$= 10x \underbrace{(x^3 - 27y^3)}$$

$$= 10x \underbrace{(x - 3y)}_{\substack{| \\ x \quad y}} (x^2 + 3xy + 9y^2)$$

HW: Prove the general case of $x^3 + y^3$ and use it to factor

$$8x^3 + 27$$

Ex. 2: Add the following

$$\frac{3}{2x-3} + \frac{x}{x-2}$$

$$= \frac{3(x-2)}{(2x-3)(x-2)} + \frac{x(2x-3)}{(x-2)(2x-3)}$$

$$= \frac{3(x-2) + x(2x-3)}{(2x-3)(x-2)}$$

$$\frac{3x - 6 + 2x^2 - 3x}{(2x - 3)(x - 2)}$$

$$\frac{2x^2 - 6}{(2x - 3)(x - 2)}, x \neq 2, \frac{3}{2}$$