Sir Isaac Newton

Welcome to ... Advanced Mathematics with Calculus 120

Gottfried Leibniz

Housework to get done today...

- Attendance
- Introductions
- Classroom Rules...
  1. Must be on time and prepared with all necessary supplies.
  2. No food or drink during class other than water and a light snack before class.
  3. Must be respectful of all others in the classroom. Someone speaking or intercom in use means EVERYONE else is listening.
- Review emergency evacuation procedures and "code black".
- Course Outline

Fundamental Skills Review

Radicals:

Simplify each of the following...

$3\sqrt{72}$

$3(6\sqrt{2})$

$=18\sqrt{2}$

$3(3\sqrt{8})$

$9\sqrt{8}$

$9(2\sqrt{2})$

$18\sqrt{2}$

$(6\sqrt{2})(5\sqrt{3})$

$(3\sqrt{8})(5\sqrt{3})$

$15\sqrt{24}$

$15(2\sqrt{6})$

$30\sqrt{6}$

$\left(\frac{\sqrt{3}}{2}\right)^2$

$\frac{3}{4}$

$(\sqrt{3})^2$

9

3

$3\sqrt{98} - 2\sqrt{32}$

$21\sqrt{2} - 8\sqrt{2}$

$=13\sqrt{2}$

1 Rationalize the denominator...

$$\frac{6}{5\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$$

$$=\frac{6\sqrt{2}}{10}$$

$$=\frac{3\sqrt{2}}{5}$$

$$\sqrt{\frac{4}{5}}=\frac{\sqrt{4}}{\sqrt{5}}$$

$$=\frac{2}{\sqrt{5}}\left(\frac{\sqrt{5}}{\sqrt{5}}\right)$$

$$=\frac{2\sqrt{5}}{5}$$

$(a-b)(a+b)$

$$\frac{2}{3+\sqrt{6}}\left(\frac{3-\sqrt{6}}{3-\sqrt{6}}\right)$$

$$\frac{6-2\sqrt{6}}{9-6}$$

$$=\frac{6-2\sqrt{6}}{3}$$

$$=2-\frac{2\sqrt{6}}{3}$$

Algebraic Processes:

Factor each of the following...

$3x^2 - 10x + 8$ (24)

$3x^2 - 6x - 4x + 8$

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

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

- Common factor
- Trinomials
- Diff. of Sq. Factors
- Sum & Diff. of Cubes
- Factor Theorem

$(x^4 - 1)^2 - 64$

$[(x^4-1) - 8][(x^4-1) + 8]$

$(x^4 - 9)(x^4 + 7)$

$(x^2 - 3)(x^2 + 3)(x^4 + 7)$

$m^2 - 6x - 8)(m+8)$

$27m^{27} + v^{12}$

$(3m^9 + v^4)(9m^{18} - 3m^9 v^4 + v^8)$

$\pm 1, \pm 2, \pm 4, \pm 8$

$3a^3 - a^2 - 10a + 8$

$a = 1$:

$3 - 1 - 10 + 8 = 0$

$\therefore a = 1$ is a Root

$\therefore (a-1)$ is a factor

	3	−1	−10	8
−1	↓	−3	−2	8
	3	2	−8	0

$(a-1)(3a^2 + 2a - 8)$ (−2x)

$3a^2 - 4a + 6a - 8$

$a(3a-4) + 2(3a-4)$

$\boxed{(a-1)(3a-4)(a+2)}$

Solve the following...

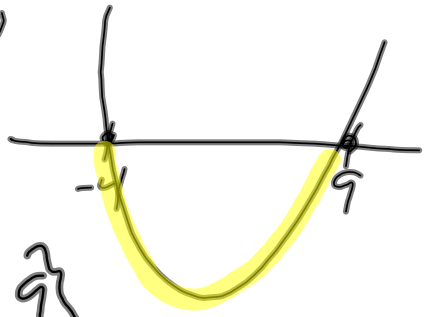
$$m^2 - 5m < 36$$

$m^2 - 5m - 36 < 0$ ← Below

$(m-9)(m+4) < 0$

$m = 9, -4$

$\{-4 < x < 9\}$



Locate the vertex of the following quadratic function...

$$f(x) = -2x^2 + 12x - 6$$