HAT
Advanced Factoring

10/16/17

Warm Up: Factor completely $x^4 - 13x^3 + 36x^2$

$x^2(x^2-13x+36)$

$x^2(x-9)(x-4)$

synthetic division
w-substitution

Ex#1: Factor completely $x^4 - 13x^2 + 36$

$W = x^2$

$(x^2)^2$

$w^2 - 13w + 36$

$(w-9)(w-4)$

$(x^2-9)(x^2-4)$

$(x+3)(x-3)(x+2)(x-2)$

Solve $x^4 - 13x^2 + 36 = 0$

$x=3$ $x=2$

$x=-3$ $x=-2$

synthetic division
w-substitution

Ex#2: Factor completely $x^4 - x^2 - 20$

$w = x^2$

$w^2 - w - 20$

$(w-5)(w+4)$

$(x^2-5)(x^2+4)$

- over the RATIONALS

$(x^2-5)(x^2+4)$

- over the REALS

$(x+\sqrt{5})(x-\sqrt{5})(x^2+4)$ $(x+\sqrt{5})(x-\sqrt{5})(x^2+4)$

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

- over the COMPLEX

$(x+\sqrt{5})(x-\sqrt{5})(x+2i)(x-2i)$

$(x+\sqrt{5})(x-\sqrt{5})(x+2i)(x-2i)$

Solve $x^4 - 20 = x^2$

$x^2+4=0$

$\sqrt{x^2} = \sqrt{-4}$

$x = \pm 2i$

$x=-\sqrt{5}$ $x=2i$

$x=\sqrt{5}$ $x=-2i$

synthetic division
grouping

Ex#3: Factor completely $(x^3 - 4x^2) + (9x - 36)$

$x^2(x-4) + 9(x-4)$

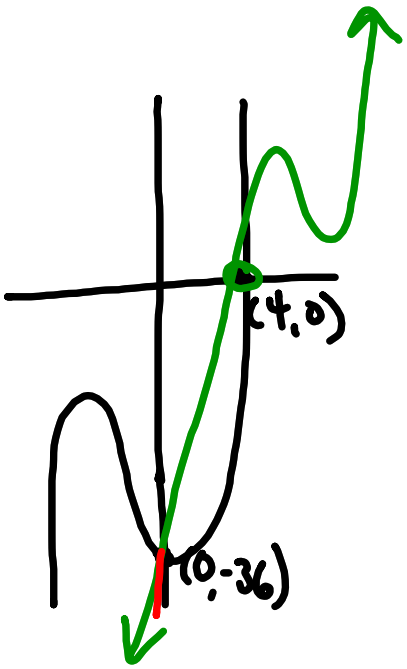
$(x-4)(x^2+9)$

$x^2 - (-9)$

$(x-4)(x+3i)(x-3i)$

$2x^2 - 3x$

$x(2x-3)$



Solve $x^3 - 4x^2 + 9x - 36 = 0$

$x = 4$

$x = 3i$

$x = -3i$

Assignment: page 347 #60, 61, 62, 64, 67, 68

For problems 60, 61, 62, and 64,
start the problem with **w-substitution**.

For problems 67 and 68,
start the problem by **grouping**.

For ALL problems, practice factoring across the **RATIONALS, REALS**, and **COMPLEX** before solving.

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