Warm up

Sum of Cubes

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

$x^6 + 27$

$(x^2+3)(x^4-3x^2+9)$

Difference of Cubes

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

$8x^3 - 64y^3$

$8(x^3-8y^3)$

$8(x-2y)(x^2+2xy+4y^2)$

Questions From Homework

② d) $(x^5 - 5x^4)(-10x^3 + 50x^2) + 9x - 45$

$x^4(x-5) - 10x^2(x-5) + 9(x-5)$

$(x-5)(x^4 - 10x^2 + 9)$ ← simple trinomial

$-9 \cdot x^{-1} = 9$

$-9 + -1 = -10$

$(x-5)(x^2-9)(x^2-1)$ ← Diff of Squares

$(x-5)(x-3)(x+3)(x-1)(x+1)$

Factor Theorem

Factor Theorem

(x-b) is a factor of f(x) **if and only if** f(b) = 0.

Hint: Find a value of "x" that will make it = 0

$x^3 + 5x^2 - 2x - 24$

$(2)^3 + 5(2)^2 - 2(2) - 24$

$8 + 20 - 4 - 24$

0

① Common Factor (none)
② Count terms (4)
↳ grouping (does not work)

(x - 2) is a factor

Use long division to find another factor:

$$x - 2 \;\overline{)\; x^3 + 5x^2 - 2x - 24}$$

$x^2 + 7x + 12$

$-(x^3 - 2x^2)$

$7x^2 - 2x - 24$

$-(7x^2 - 14x)$

$12x - 24$

$-(12x - 24)$

0

Factor further (if possible):

$(x-2)(x^2+7x+12)$ ← simple trinomial

$3 \times 4 = 12$
$3 + 4 = 7$

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

Factor Theorem

Factor Theorem

(x-b) is a factor of f(x) **if and only if** f(b) = 0.

$P(x) = 2x^3 - 5x^2 - 4x + 3$

$= 2(-1)^3 - 5(-1)^2 - 4(-1) + 3$

$= -2 - 5 + 4 + 3$

$= 0$

$(x-(-1))$ is a factor

$(x+1)$

$x+1 \overline{)\,2x^3 - 5x^2 - 4x + 3}$

$2x^2 - 7x + 3$

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

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

$-(-7x^2 - 7x)$

$3x + 3$

$-(3x + 3)$

0

Factor Further: ← Decomp.

$(x+1)(2x^2 - 7x + 3)$ $-1 \times -6 = 6$, $-1 + -6 = -7$

$(x+1)[(2x^2 - x)(-6x + 3)]$

$(x+1)[x(2x-1) - 3(2x-1)]$

$(x+1)(2x-1)(x-3)$

Homework

③ b) $x^3 - 7x + 6 \longrightarrow x^3 + 0x^2 - 7x + 6$