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today: 6-13-18

formulas Quiz 1
Start 5.1 (pp. 61-?)

* 12 days until Ch 4 and 5 Test. *

page 61) 5.1 Polynomial functions and Models

Identify Polynomials and their degree.

$f(x) = \square + \square x + \square x^2 + \square x^3 + \ldots$
is a polynomial if each box contains a real number.
* no fractional exponents or negative exponents

#16 and 17

$g(x) = \frac{\pi - x^2}{8} \rightarrow \frac{\pi}{8} - \frac{1}{8}x^2 \rightarrow$ yes, a polynomial! degree: 2

$f(x) = 4 - \frac{5}{x} \rightarrow 4 - \frac{5}{1}\cdot\left(\frac{1}{x}\right) \rightarrow 4 - 5x^{-1}$

→ not a polynomial.
(exponent is not a counting #)

#20

$G(x) = 8(x-4)(x^2+6)$

$= 8(x-4)(x-4)(x^2+6)$

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$= 8(x-4)(x-4)(x^2+6)$

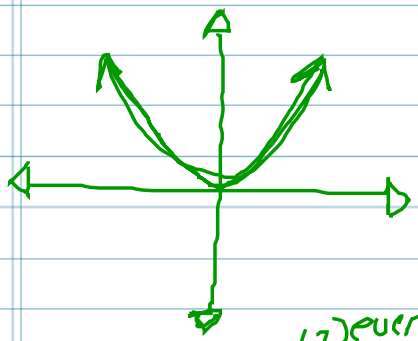
yes, Poly ✓ degree 1. ✓ yes, Poly! ✓ degree 2.

yes, poly !! degree 0.

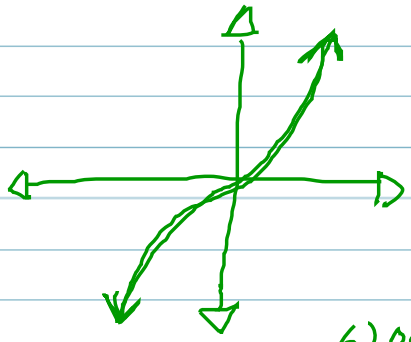
$\Rightarrow$ all parts are polynomials, so the whole thing is a polynomial.

Identify Real Zeros and their Multiplicity.

(roots / Zeros / x-intercept)



$f(x) = x^{(2)}$ even



$f(x) = x^{(3)}$ odd

#33

$$f(x) = 5(x^2+9)(x-4)^3$$

(a) Zeros, Multiplicities?

$$0 = 5(x^2+9)(x-4)(x-4)(x-4)$$

$\rightarrow$ $5 = 0$ false. no root.

$\longrightarrow$ $x^2+9 = 0$

$x^2 = -9$

$x = \pm\sqrt{-9}$

$x = \pm 3i$

no root

$\rightarrow$ $x-4 = 0$

$x = 4$ ✓

the root 4 has Multiplicity 3.
(odd)(crosses)

#37

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

$$0 = -7 \cdot x \cdot x \cdot (x^2-7)$$

$-7 = 0$ — no Sol. no root.

$x = 0$ $x = 0$ — root zero has Multiplicity 2 (touch)

$x^2 - 7 = 0$

$x^2 = 7$

$x = \pm\sqrt{7}$ ↓

$x = -\sqrt{7}$

and

$x = +\sqrt{7}$

the root $\sqrt{7}$ has multiplicity 1 and the root $-\sqrt{7}$ also has multiplicity 1.

(both Cross)

Turning Points and End Behavior

$f(x) = 5(x^2+9)(x-4)^3$

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

yes. $d = 0$ yes. $d = 2$ yes. $d = 1$

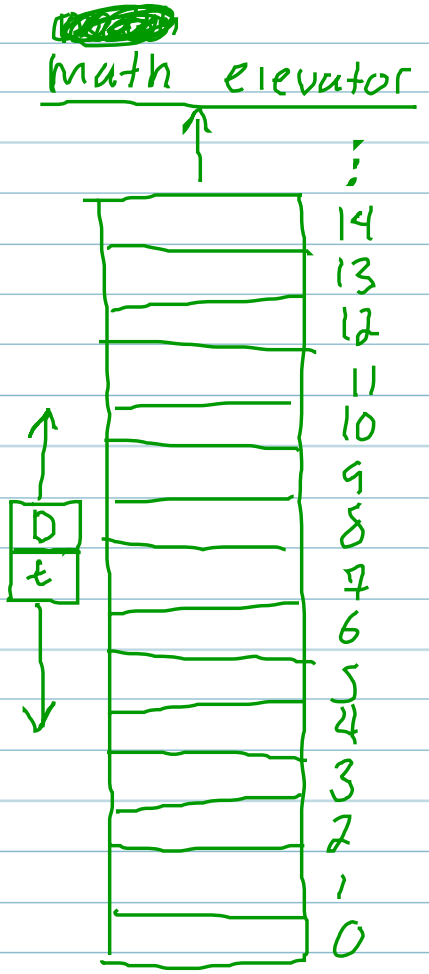
→ $f(x)$ has degree 5.

→ max # of turning points $= 4$.

→ end Behavior: $5 \cdot x^5$

$y = 5x^5$

math elevator



#37

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

degree: 4

Max # of turning points: 3

$f(x) = -7 \cdot x \cdot x \cdot (x^2-7)$ ← factored form

$0 + 1 + 1 + 2 = 4$

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

$f(x) = -7x^4 + 49x^2$ ← polynomial form

end Behavior: $-7x^4 = y$

$(y = -7x^4)$

Creating Polynomials

#29

degree: 3 LC: 1

Zero	Multi.
-2	1
0	1
7	1

root	factor
3	$x-3$
r	$x-r$ ✱

(#29 continued)

Zero	Mult.	factor
-2	1	$(x+2)$
0	1	x
7	1	$(x-7)$

$k(x) = 1(x+2)(x)(x-7)$ ← factored form

$= (x+2)(x)(x-7)$

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

$= x^3 - 7x^2 + 2x^2 - 14x$

$k(x) = x^3 - 5x^2 - 14x$ ← polynomial form

#31

degree: 3 LC: 1

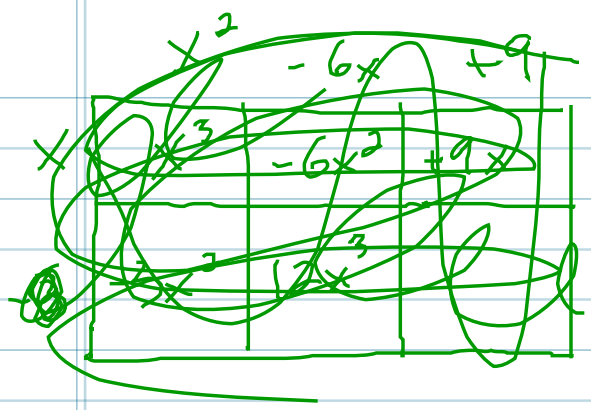
Zero	Mult:	factor
8	1	$(x-8)$
3	2	$(x-3)$

$f(x) = 1(x-8)(x-3)(x-3)$

$= (x-8)(x-3)(x-3)$

$= (x-8)(x^2-6x+9)$

$=$ ↓



← wrote 3 instead of 8 oops $\frac{11}{0}$

	x^2	$-6x$	$+9$
x	x^3	$-6x^2$	$+9x$
-8	$-8x^2$	$+48x$	-72

Bonus Question:

deg: 2 lead: 2

Zeros	Multi.	Factor
2	2	$(x-2)$

$f(x) = 2(x-2)(x-2)$

$f(x) = 2x^2 - 8x + 8$