MRS21-Lesson-1 Mr. Pineda

Aim: How can we use pattern recognition to determine the best type of function to model bivariate data?

Do now: Use the following tables to answer the questions below the tables

Degree	Name Using Degree	Polynomial Example	Number of Terms	Name Using Number of Terms
0	constant	5	1	monomial
1	linear	$x + 4$	2	binomial
2	quadratic	$4x^2$	1	monomial
3	cubic	$4x^3 - 2x^2 + x$	3	trinomial
4	quartic	$2x^4 + 5x^2$	2	binomial
5	quintic	$-x^5 + 4x^2 + 2x + 1$	4	polynomial of 4 terms

Take note **Key Concept** **Standard Form of a Polynomial Function**

The standard form of a polynomial function arranges the terms by degree in descending numerical order.

A polynomial function $P(x)$ in standard form is

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0,$$

where n is a nonnegative integer and $a_n, \ldots, a_0$ are real numbers.

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

Cubic term | Quadratic term | Linear term | Constant term

Write each polynomial in standard form. Then classify it by degree and by number of terms.

1. $4x^3 - 3 + 2x^2$

To start, write the terms of the polynomial with their degrees in descending order. $4x^3 + 2x^2 - 3$

2. $8 - x^5 + 9x^2 - 2x$

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

4. $-6x^3$

5. $3 + 24x^2$

I – End Behavior

1) The degree of a polynomial function affects the shape of its graph and determines the maximum number of turning points, or places where the graph changes direction. It also affects the end behavior, or the directions of the graph to the far left and to the far right.

2) Example:

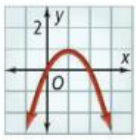
$y = 4x^4 + 6x^3 - x$

End Behavior: Up and Up

Turning Points: $(-1.07, -1.04)$, $(-0.27, 0.17)$, and $(0.22, -0.15)$

The function is decreasing when $x < -1.07$ and $-0.27 < x < 0.22$. The function increases when $-1.07 < x < -0.27$ and $x > 0.22$.

$y = -x^2 + 2x$



End Behavior: Down and Down

Turning Point: $(1, 1)$

The function is increasing when $x < 1$ and is decreasing when $x > 1$.

3) **Determine the end behavior of the graph of each polynomial function.**

6. $y = 5x^3 - 2x^2 + 1$ **7.** $y = 5 - x + 4x^2$ **8.** $y = x - x^2 + 10$

9. $y = 3x^2 + 9 - x^3$ **10.** $y = 8x^2 - 4x^4 + 5x^7 - 2$ **11.** $y = 20 - x^5$

12. $y = 1 + 2x + 4x^3 - 8x^4$ **13.** $y = 15 - 5x^6 + 2x - 22x^3$ **14.** $y = 3x + 10 + 8x^4 - x^2$

a) Conclusion: (for end behavior)_____

Hint: **End Behavior of a Polynomial Function With Leading Term ax^n**

b) Conclusion: (number of turning points)_____

II- Using Differences to determine degrees

1)

2) **What is the degree of the polynomial function that generates the data shown at the right?**

x	y
−3	−1
−2	−7
−1	−3
0	5
1	11
2	9
3	−7

3) Determine the degree of the polynomial function with the given data.

a)

x	*y*
–3	–43
–2	–10
–1	1
0	2
1	5
2	22
3	65

b)

x	*y*
–3	65
–2	5
–1	–5
0	–1
1	5
2	25
3	95