

Sec. 5.1 Polynomial Functions

Vocabulary

- monomial: a real number, a variable, or the product of a real number and one or more variables with whole number exponents.

ex: $17, 3x^2, \frac{1}{2}xyz^5, p$

- degree of a monomial: sum of the exponents of the variables

ex: $17 \rightarrow 17x^0 \rightarrow 17(1) \rightarrow 0$

$3x^2 \rightarrow 2$

$\frac{1}{2}x^1y^1z^5 \rightarrow 7$

- polynomial: a monomial or a sum of monomials

ex: $\frac{1}{2}xyz^5 + 3x^2 - 17$

- degree of a polynomial: degree of the highest degree term

ex: $\frac{1}{2}xyz^5 + 3x^2 - 17 \rightarrow \boxed{7}$

$3x^5 - 2x^3 + 5x \rightarrow 5$

- standard form of a polynomial function:

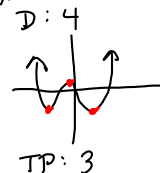
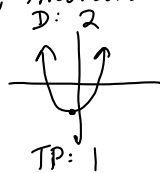
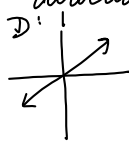
$$P(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_1 x + a_0 x^0$$

ex: $P(x) = 3x^3 - 5x^2 + 2x - 7$

Cubic term Quadratic term Linear term Constant term

Degree	Polynomial Name	Ex.	# Terms Name
0	constant	5	monomial
1	linear	$3x - 2$	binomial
2	quadratic	$4x^2$	monomial
3	cubic	$7x^3 - 2x + 1$	trinomial
4	quartic	$2x^4 + 5x^2$	binomial
5	quintic	$-x^5 + 4x^2 + 2x + 1$	polynomial of 4 terms

- **turning point**: places where the graph changes direction; minimums and maximums occur



maximum number of turning points: $n - 1$ (degree - 1)

end behavior: direction of the graph to the far left or far right

$a > 0$ (positive)	$a < 0$ (negative)	Degree
down and <u>up</u>	up and <u>down</u>	ODD
up and <u>up</u>	down and <u>down</u>	EVEN

Problem 1: Write $-3x + 4x^3 + 7x - 3$ in standard form. Classify by degree and number of terms.

$$4x^3 + 4x - 3 \quad \begin{array}{l} D: \text{cubic} \\ T: \text{trinomial} \end{array}$$

Problem 2: What is the end behavior?