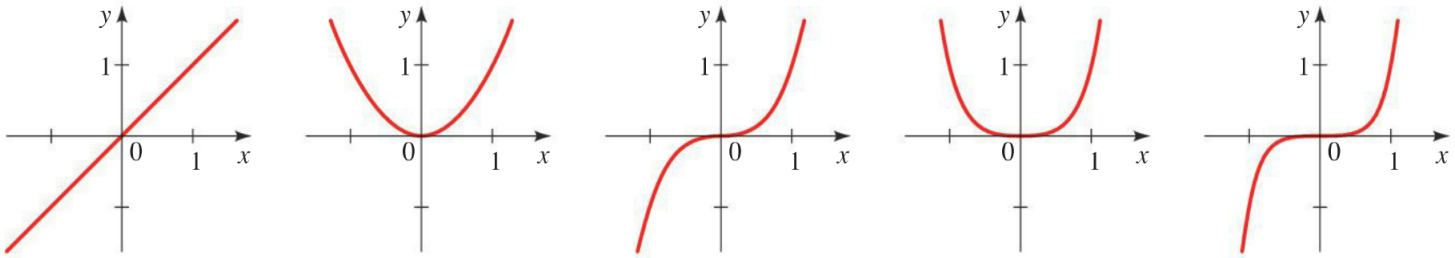
Math 121 (Lesieutre); §4.1, Part 1; August 28, 2017

1. Here are three polynomials. For each one: what are the degree, the coefficients, the constant term, the leading coefficient, and the leading term?

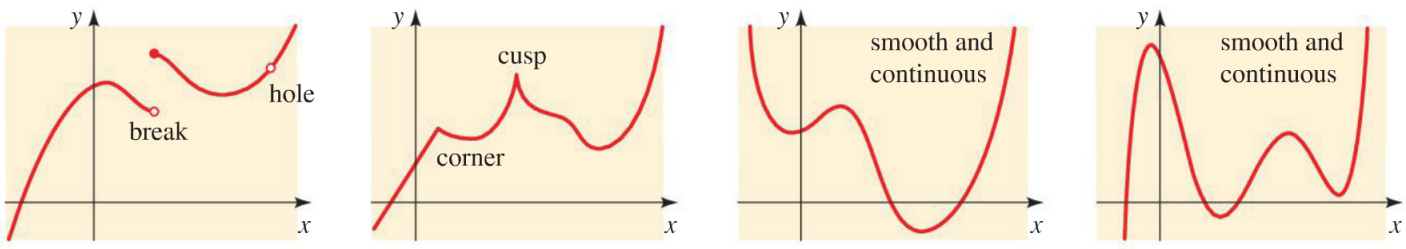
$$p(x) = 5x^7 - 3x^3 + 2x - 11, \quad q(x) = -12 + 4x^6 - 2x^2 + 8x^9, \quad r(x) = x(x+2)(x-1).$$

2. Some basic examples:



(a) $y = x$ (b) $y = x^2$ (c) $y = x^3$ (d) $y = x^4$ (e) $y = x^5$

3. Polynomials are smooth functions:



Not the graph of a polynomial function

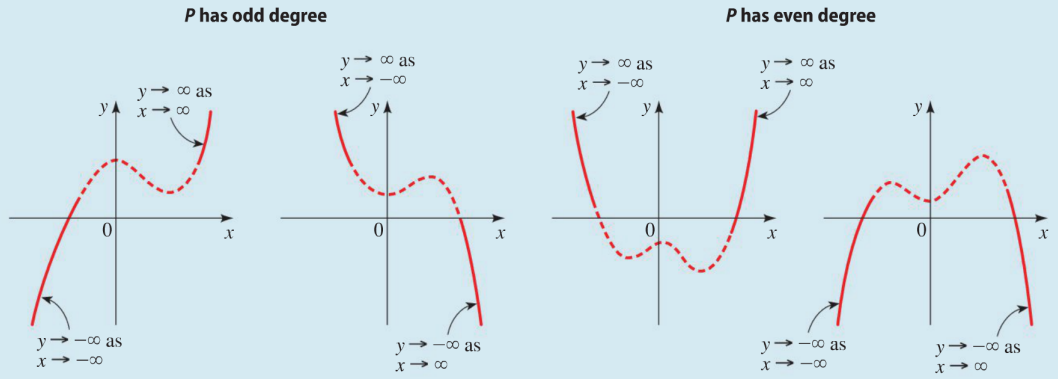
Not the graph of a polynomial function

Graph of a polynomial function

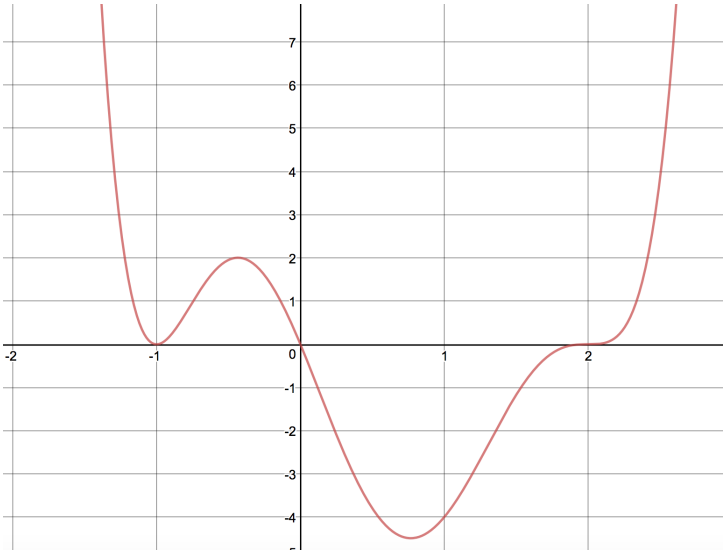
Graph of a polynomial function

4. End behavior and general shape:

The end behavior of the polynomial $P(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0$ is determined by the degree n and the sign of the leading coefficient a_n, as indicated in the following graphs.



5. Zeroes and multiplicity:



6. Let's say we have a polynomial with zeros $x = -2$, $x = 0$, and $x = 2$, and it passes through the point $(-4, 16)$. Can you come up with a formula? Sketch the graph?