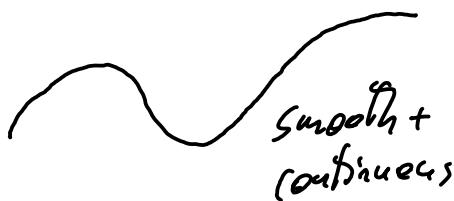


Section 3.2 Graphs of polynomial functions

Given $f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0$

a polynomial there are certain assumptions we will make about its graph $y = f(x)$.

1. The graph $y = f(x)$ is both smooth and continuous

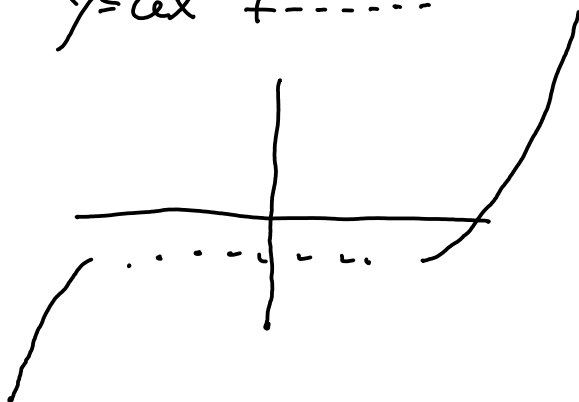


2. The ends of the graph go to $\pm\infty$.

example even degree $a > 0$
 $y = ax^{2n} + \dots$



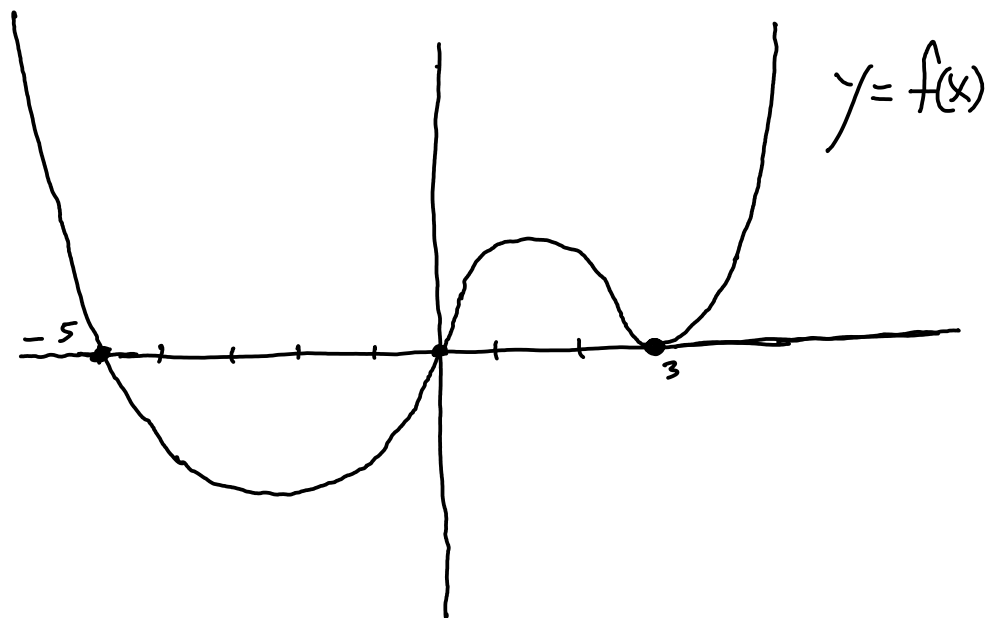
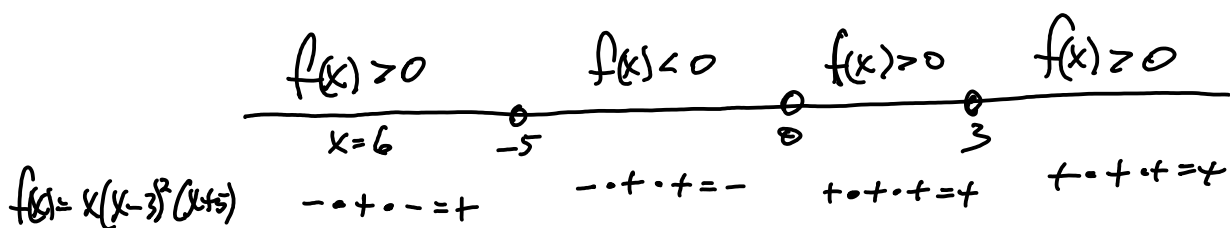
odd degree $a > 0$
 $y = ax^{2n+1} + \dots$



Other than these two facts, if we can factor a polynomial $f(x)$ into linear and irreducible factors of even degree then we can tell where $f(x) = 0$ that is where the x -intercepts are.

example $f(x) = x(x-3)^2(x+5)$ $f(x) = 0$ at $x = -5, 0, 3$

We can also tell from here where $f(x) > 0$ and $f(x) < 0$



example Sketch the graph of $f(x) = x^3 + 2x^2 - x - 2$

First let's factor as completely as possible.

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

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

$$f(x) = (x^2 - 1)(x+2)$$

$$f(x) = (x-1)(x+1)(x+2)$$

