

2.3 Polynomials of Higher Degree

Zeros of polynomial functions

↳ x -int, solutions to $f(x)=0$, roots

Multiplicity (of $m \geq 2$)

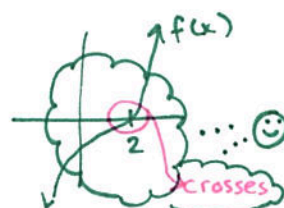
↳ repeated zero

$$f(x) = (x-c)^m$$

$x=c$ is a zero w/ multiplicity m

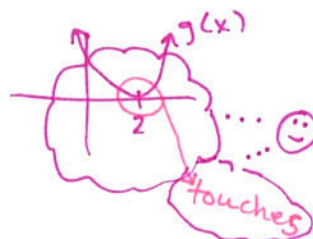
• Odd multiplicity \rightarrow graph crosses x -axis @ $x=c$

ex: $f(x) = (x-2)^3$ ← odd



• Even multiplicity \rightarrow graph touches x -axis @ $x=c$

ex: $g(x) = (x-2)^4$ ← even



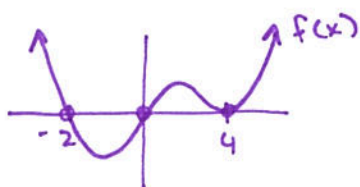
ex: Describe zeros, multiplicity, and sketch the graph.

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

↳ $x=0$ multiplicity 3 (odd, so crosses thru x -axis)

↳ $x=4$ multiplicity 2 (even, so touches x -axis)

↳ $x=-2$ multiplicity 1 (odd, so crosses thru x -axis)



end behavior: $\lim_{x \rightarrow -\infty} f(x) = \infty$

$f(x) \approx x^3 \cdot x^2 \cdot x$
 $\approx x^6$
 $\lim_{x \rightarrow \infty} f(x) = \infty$