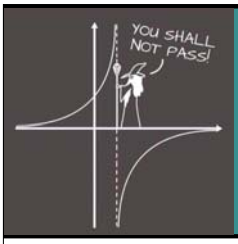
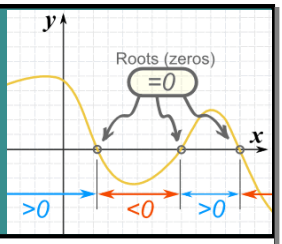


Unit 3: Polynomial, Radical, and Rational Functions



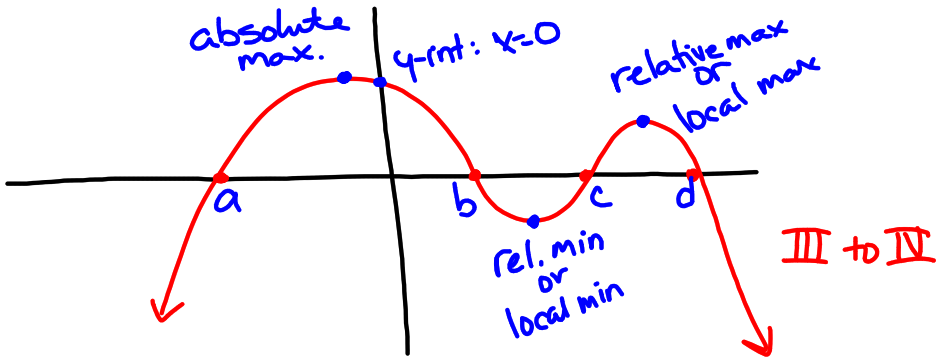
3.4 Graphing Polynomials

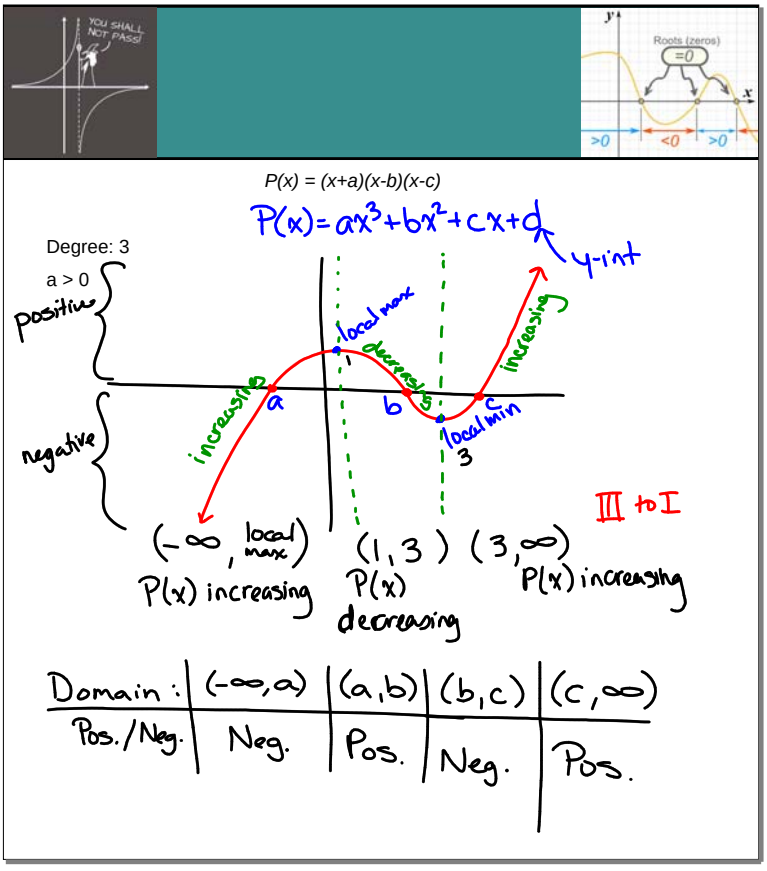
Factored Form: $P(x) = (x+a)(x-b)(x-c)(x-d)$ (leading coefficient)

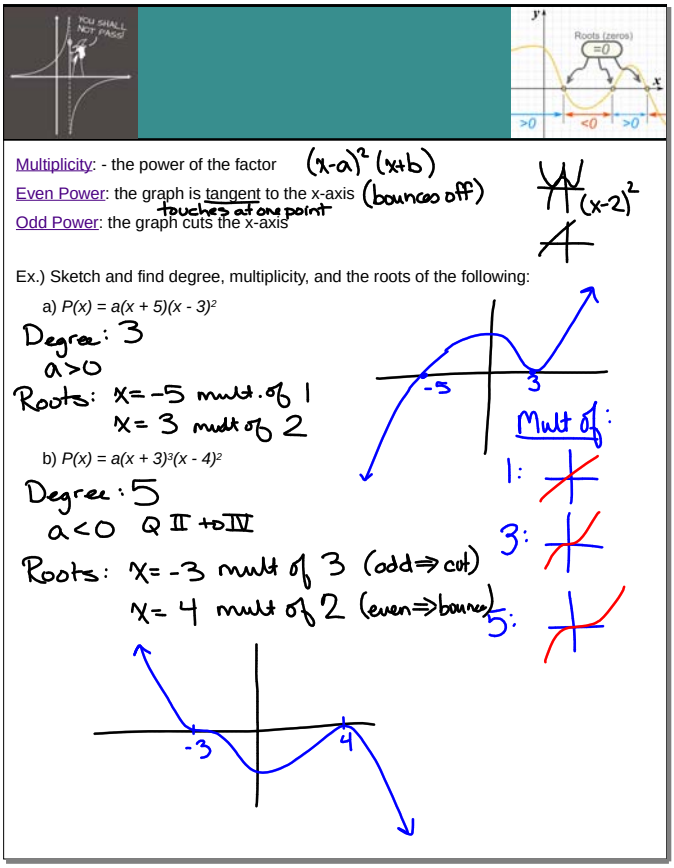
Degree: 4

$a < 0$

Expanded Form: $P(x) = ax^4+bx^3+cx^2+dx+e$







Multiplicity: - the power of the factor $(x-a)^2(x+b)$

Even Power: the graph is tangent to the x-axis (touches at one point) (bounces off)

Odd Power: the graph cuts the x-axis

$(x-2)^2$

Ex.) Sketch and find degree, multiplicity, and the roots of the following:

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

Degree: 3

$a>0$

Roots: $x=-5$ mult. of 1

$x=3$ mult of 2

Mult of:

1:

3:

5:

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

Degree: 5

$a<0$ QII to QIV

Roots: $x=-3$ mult of 3 (odd ⇒ cut)

$x=4$ mult of 2 (even ⇒ bounce)

Ex.) Given $P(x) = 3(x - 2)(x + 1)(x - 4)^2$, sketch the graph.

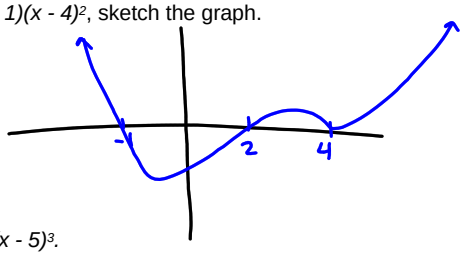
Degree: 4

Roots:

$x=2$ mult 1

$x=-1$ mult. 1

$x=4$ mult 2



Ex.) Sketch $P(x) = -2(x + 3)^2(x - 5)^3$.

Degree: 5

Roots:

$x=-3$ mult 2

$x=5$ mult 3