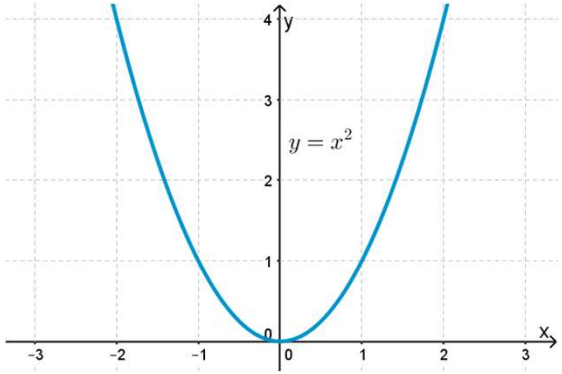
3.2 Notes: Polynomial Functions

Describe the end behavior of each graph:

$y = x^2$

$y \to \infty$ as $x \to -\infty$

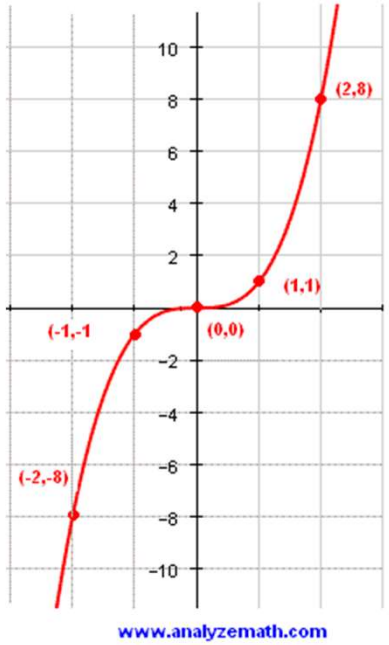
$y \to \infty$ as $x \to \infty$



$y = x^3$

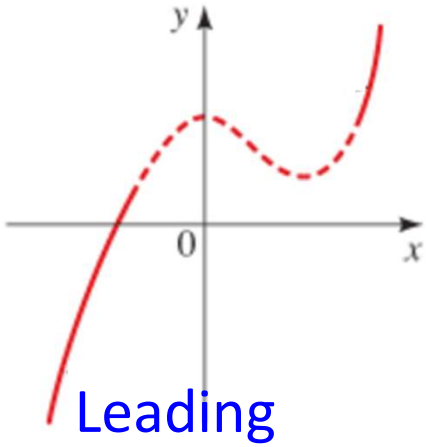
$y \to -\infty$ as $x \to -\infty$

$y \to \infty$ as $x \to \infty$

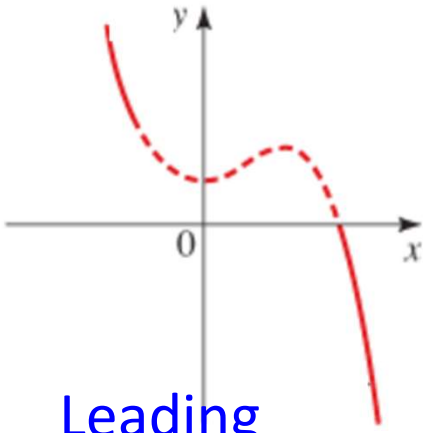


General shape/direction of odd and even functions:

P has Odd Degree

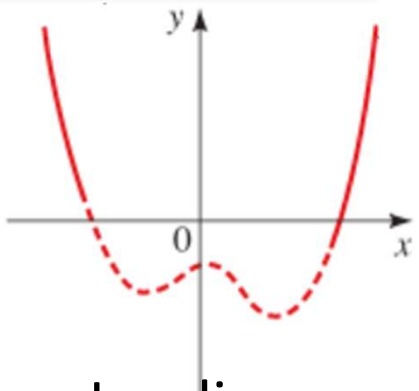


Leading coefficient is positive

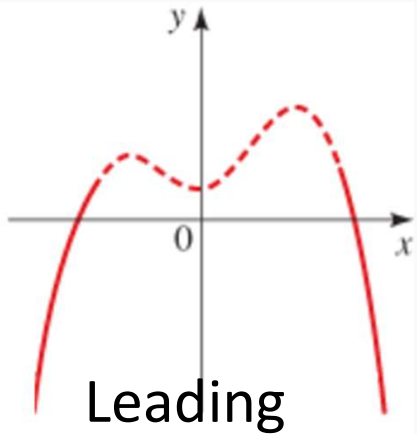


Leading coefficient is negative

P has even Degree



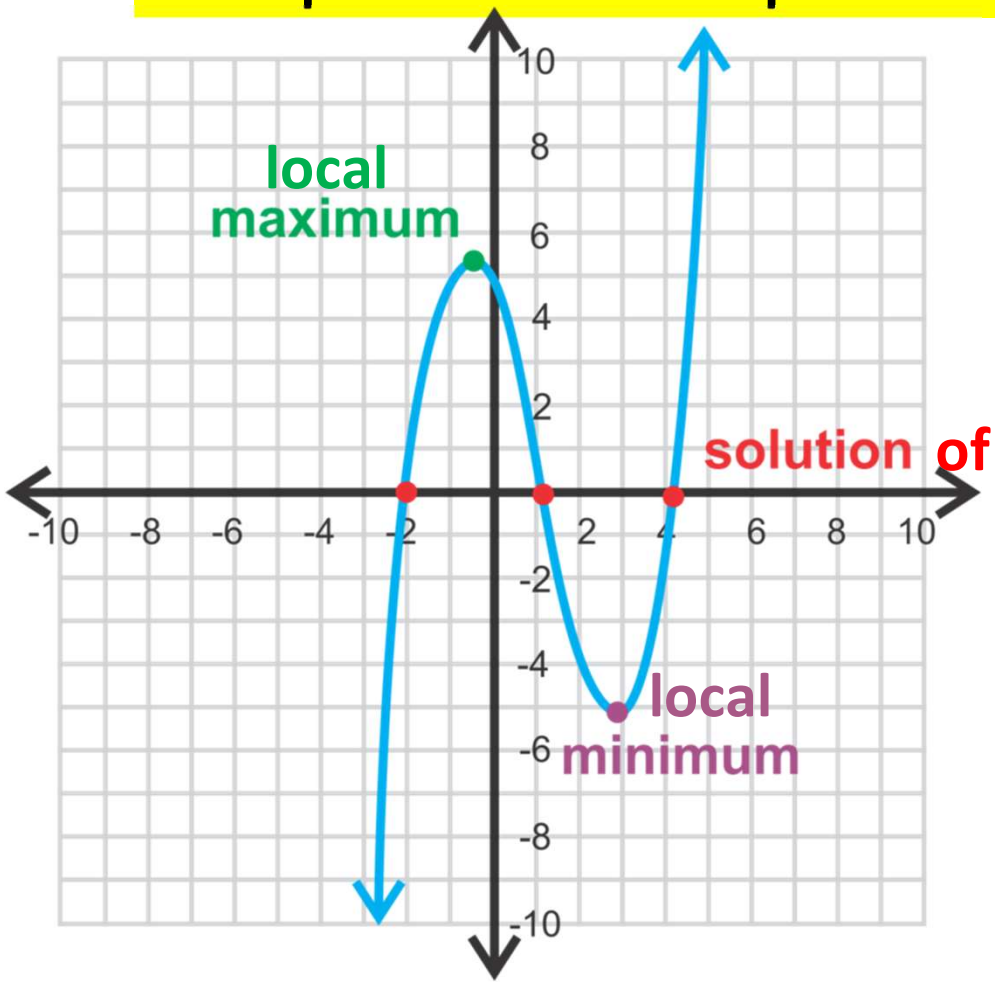
Leading coefficient is positive



Leading coefficient is negative

Note: the number of x-intercepts will create variation in the dashed area.

Local maximums and minimums are high and low points in a specific viewing window.

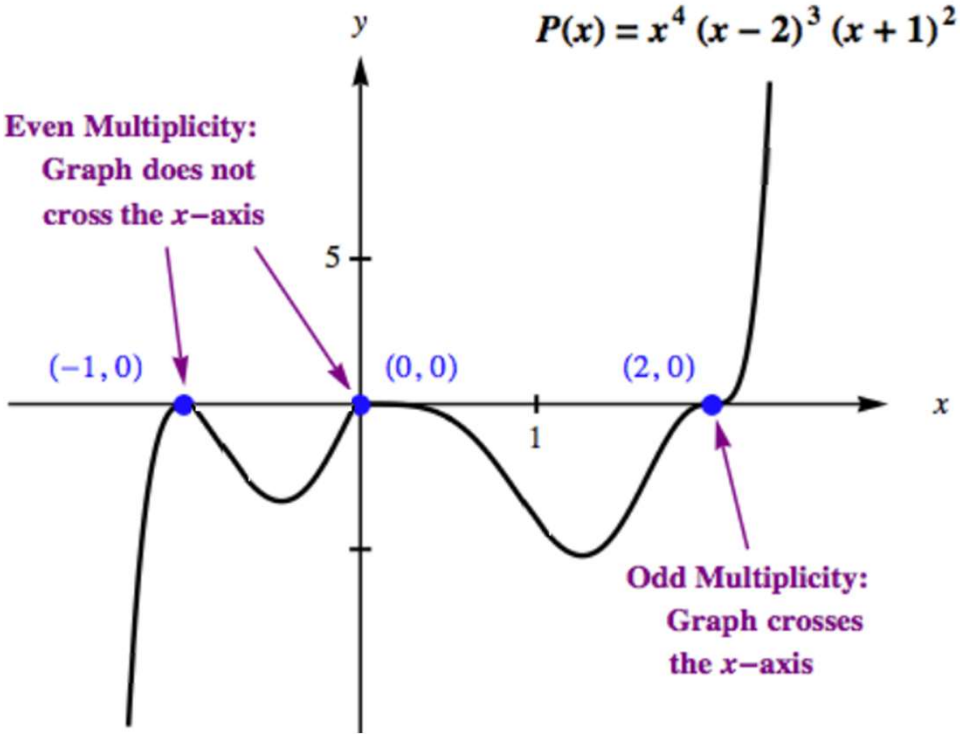


solution of equation → x-intercepts

Multiplicity:

If exponent is **even**, then the graph "**bounces**" off the axis (doesn't pass through.)

If exponent is **odd**, then the graph **passes through** the axis with a change in curvature.



$$P(x) = x^4 (x-2)^3 (x+1)^2$$

$x = 0$ $x = 2$ $x = -1$

bounce pass thru bounce

x^3-4x

9. $P(x)=x(x^2-4)$

SPECIAL INSTRUCTIONS FOR #9-14:

a) State **leading term**, then write if degree is **even/odd** and if coefficient is **positive or negative.**

b) Factor and solve for x-intercepts→**use coordinates.**

c) Identify proper graph AND **sketch it** on your hw paper.

d) Describe the end behavior of the graph.

a.) leading term = x^3

Coefficient = positive

degree = odd

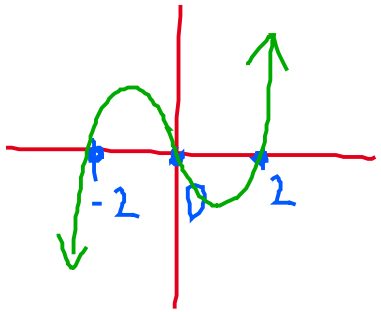
b.) $P(x)=x(x^2-4)$

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

x-int

(0,0) (-2,0) (2,0)

c.) graph III



d.)

$y \to -\infty$ as $x \to -\infty$

$y \to \infty$ as $x \to \infty$

For #9-14, please be sure to follow the instructions on the check answer sheet (instead of the book.)

3.2 #9-14, 32-36, 43, 51-54

SPECIAL INSTRUCTIONS FOR #9-14:

a) State **leading term**, then write if degree is **even/odd** and if coefficient is **positive or negative.**
b) Factor and solve for x-intercepts→**use coordinates**.
c) Identify proper graph AND **sketch it** on your hw paper.
d) Describe the end behavior of the graph.

CHECK EVEN ANSWERS→10,12,14
(each part is listed in random order)

a) $-x^3$ $-x^4$ $\frac{1}{2}x^6$ odd even even
positive negative negative

b) (-2, 0) (-2, 0) (0, 0) (0, 0) (0, 0) (2, 0) (2, 0) (2, 0)

c) I II IV → be sure to sketch graph!

d)
$y \to -\infty$ as $x \to -\infty$
$y \to -\infty$ as $x \to \infty$
$y \to -\infty$ as $x \to \infty$
$y \to \infty$ as $x \to \infty$
$y \to \infty$ as $x \to -\infty$
$y \to \infty$ as $x \to -\infty$

CHECK→32,34,36 (-4, 0) (-3, 0) (-1, 0) (0, 0) (0, 0) (0, 0) $\left(\frac{1}{2}, 0\right)$ (2, 0) (3, 0)

CHECK→32,34,36 (0, 0) (0, 0) (0, 0) (0, 0) (0, 0) (3, -3) (3, -3) (4, 0) $\left(\frac{9}{2}, 0\right)$