Example 2:

Determine the end behavior of the graph of each polynomial.

1. $f(x) = 5x^3 + 2x^2 - 3x + 4$

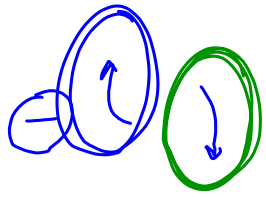
3 (odd), ⊕ ↙ ↗

as $x \to -\infty$, $f(x) \to -\infty$

as $x \to \infty$, $f(x) \to \infty$

2. $f(x) = -4x^5 + 3x^2 - 1$

odd



as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to -\infty$

3. $f(x) = 9x^4 - 3x^2 + x - 2$

even ⊕ ↑ ↑

as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to \infty$

4. $f(x) = 3 + 2x - 4x^7 - 5x^8$

even ⊖ ↓ ↓

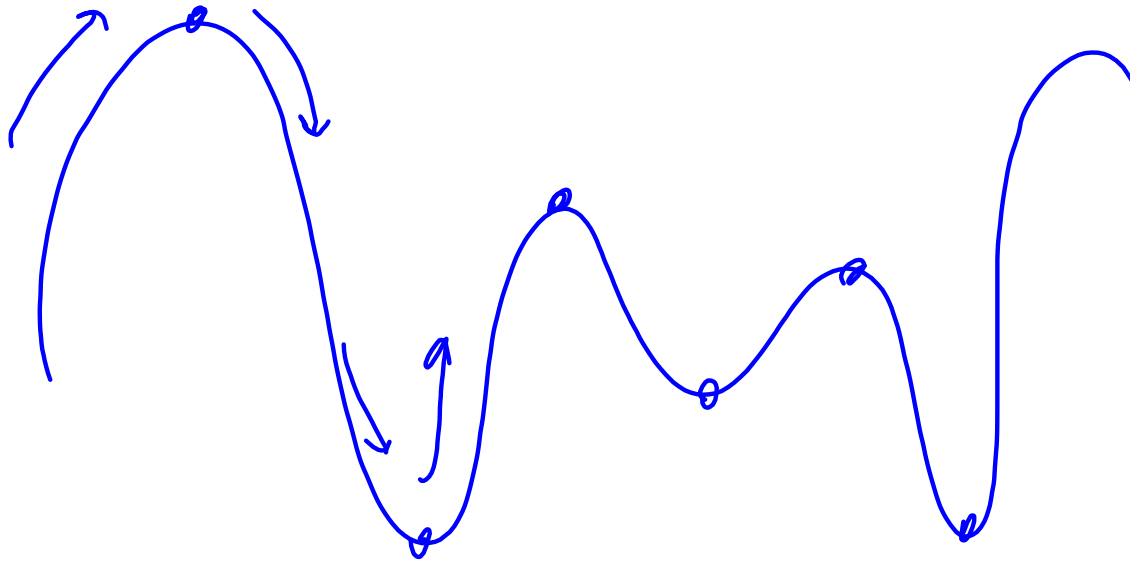
as $x \to -\infty$, $f(x) \to -\infty$

as $x \to \infty$, $f(x) \to -\infty$

Using Desmos, determine the rule for the maximum number of "turns" (i.e. number of maximum or minimum values for a function).

Turning Points:

a polynomial function of degree *n* has at most *n - 1* turning points, with at least one turning point between each pair of successive zeros



Example 3:

Use a graphing calculator to determine the coordinates of the turning points of the graph of each polynomial function. Give answers to the nearest thousandth.

1. $f(x) = x^3 + 4x^2 - 8x - 8$

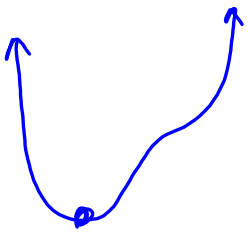
max: (-3.442, 26.147)
min: (0.775, -11.332)

2. $f(x) = 2x^3 - 5x^2 - x + 1$

max: (-0.095, 1.048)
min: (1.761, -5.344)

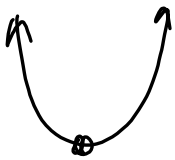
3. $f(x) = x^4 - 7x^3 + 13x^2 + 6x - 28$

max: none
min: (-0.198, -28.622)



Example 4:

Determine the domain and range of the following functions.



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

D: all reals

R: $y \geq 1.903$

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

D: all reals

R: $y \geq -5.235$

*look @ the y-coordinate!

3. $f(x) = x^5 - 3x^3 + x + 2$

D: all reals

R: all reals