

## Analyzing Graphs of Polynomial Functions

Example 1: Find the following:

x-int:  $(-4, 0)$   $(-3, 0)$   $(3, 0)$

y-int:  $(0, 72)$

local maximum:  $(0.852, 80.3)$

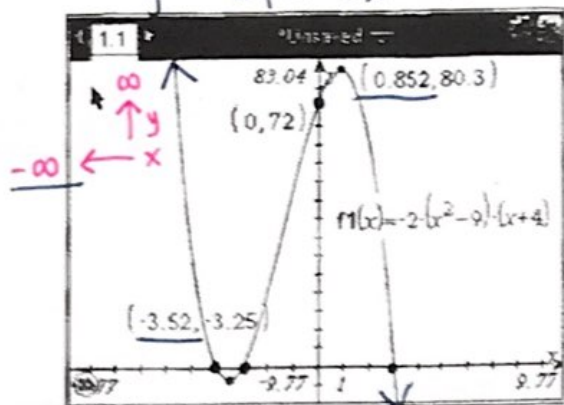
local minimum:  $(-3.52, -3.25)$

absolute maximum:  $\infty$

absolute minimum:  $-\infty$

$$y = -2(x^2 - 9)(x + 4)$$

$$y = -2(x + 3)(x - 3)(x + 4)$$



$(x, y)$

X-values

interval of increasing:  $(-3.52, 0.852)$

interval of decreasing:  $(-\infty, -3.52) \cup (0.852, \infty)$

end behavior: left  $\rightarrow$  As  $x \rightarrow -\infty, y \rightarrow \infty$  right  $\rightarrow$  As  $x \rightarrow \infty, y \rightarrow -\infty$

Example 2:  $f(x) = x^3 + 2x^2 - 5x + 1$ . Find the following:

x-int:  $(-3.51, 0)$   $(0.222, 0)$   $(1.29, 0)$

y-int:  $(0, 1)$

local maximum:  $(-2.12, 11.1)$

local minimum:  $(0.786, -1.21)$

absolute maximum:  $\infty$

absolute minimum:  $-\infty$

interval of increasing:  $(-\infty, -2.12) \cup (0.786, \infty)$

interval of decreasing:  $(-2.12, 0.786)$

end behavior: left  $\rightarrow$  as  $x \rightarrow -\infty, y \rightarrow -\infty$

right  $\rightarrow$  as  $x \rightarrow \infty, y \rightarrow \infty$

List everything you know about the given function.

- even degree
- pos. leading coefficient

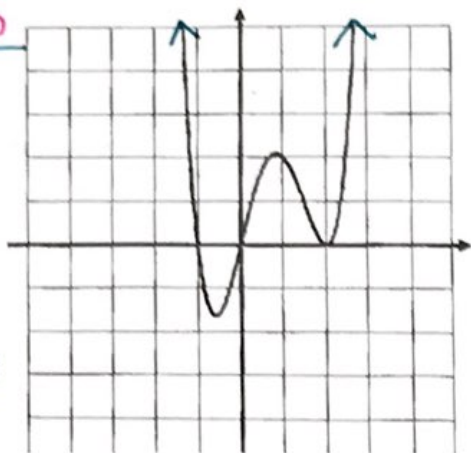
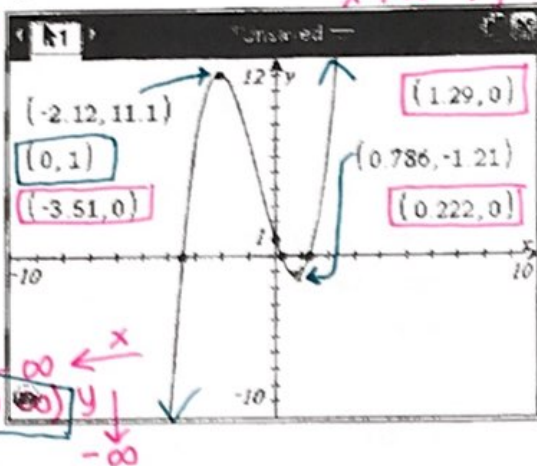
x-int.  $(-1, 0)$   $(0, 0)$   $(2, 0)$

y-int.  $(0, 0)$

local min.  $(2, 0)$

absolute min.  $(-0.5, -1.6)$

local max  $(0.9, 2.1)$  absolute max  $\infty$



end behavior

left: As  $x \rightarrow -\infty, y \rightarrow -\infty$   
right: As  $x \rightarrow \infty, y \rightarrow \infty$