3.2 Practice – Extrema & Function Analysis
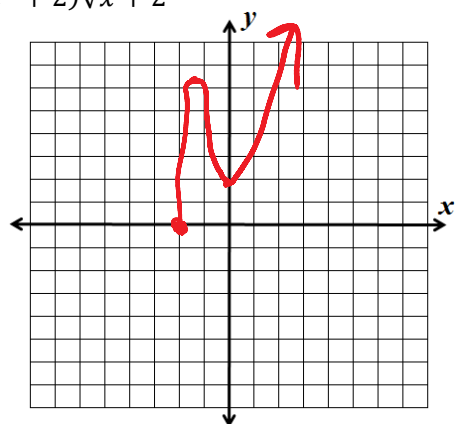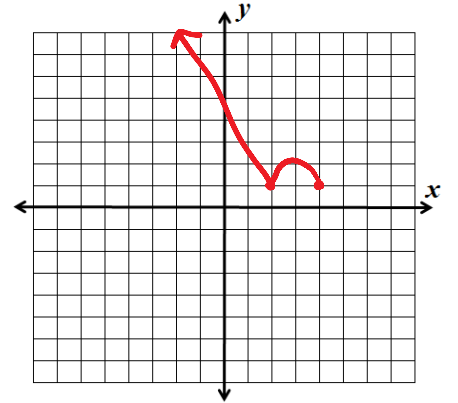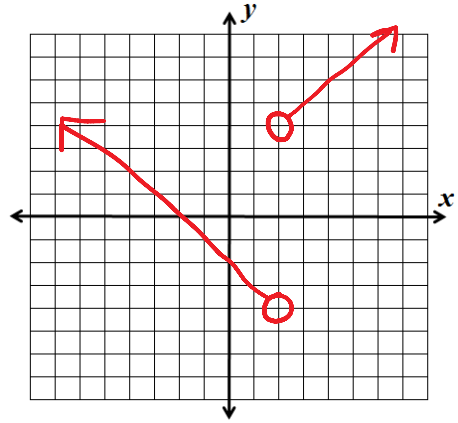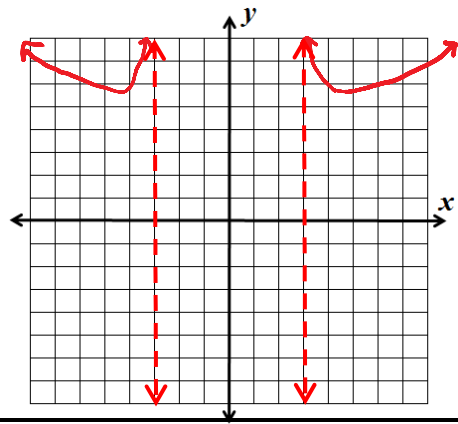
Name: ___**SOLUTIONS**___

Pre-Calculus

Using the graph and/or the function's equation, find all of the following. Use Interval Notation when describing intervals. Sketch the graph if it is not given.

Domain: $(-\infty, -1) \cup [1, \infty)$	Absolute max/min value(s): **Abs Max value = 4**

1.

Extrema: (list the type)
Local MIN at $(1, -4)$.
Abs Max at $(3, 4)$.

Increasing: $(-\infty, -1) \cup (1, 3)$	Decreasing: $(3, \infty)$

Left End-behavior: $\lim\limits_{x \to -\infty} f(x) = -\infty$	Right End-behavior: $\lim\limits_{x \to \infty} f(x) = -\infty$

Domain: $(-\infty, -3] \cup [3, \infty)$	Absolute max/min value(s): **Abs Min value = 0**

2. $h(x) = \sqrt{x^2 - 9}$

Local max/min value(s) that are NOT absolute:
No other relative extrema.

Increasing: $(3, \infty)$	Decreasing: $(-\infty, -3)$

Left End-behavior: $\lim\limits_{x \to -\infty} f(x) = \infty$	Right End-behavior: $\lim\limits_{x \to \infty} f(x) = \infty$

Domain: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$	Absolute max/min value(s): **NONE**

3. $g(x) = \dfrac{x^3 - 8}{x^2 - 4} = \dfrac{(x-2)(x^2+2x+4)}{(x-2)(x+2)}$

hole

Local max/min value(s) that are NOT absolute:
Relative MAX value -6.
Relative MIN value 2.

Increasing: $(-\infty, -4) \cup (0, \infty)$	Decreasing: $(-4, -2) \cup (-2, 0)$

Left End-behavior: $\lim\limits_{x \to -\infty} f(x) = -\infty$	Right End-behavior: $\lim\limits_{x \to \infty} f(x) = \infty$

		4. $f(x) = 0.7(5x^2 + 2)\sqrt{x + 2}$
Domain: $[-2, \infty)$	Absolute max/min value(s): **Abs MIN value = 0**	
Local max/min value(s) that are NOT absolute: **Relative MAX value 6.58.** **Relative MIN value 1.967.**		
Increasing: $(-2, -1.548) \cup$ $(-0.052, \infty)$	Decreasing: $(-1.548, -0.052)$	
Left End-behavior: $\lim_{x \to -\infty} f(x) = $ **N/A**	Right End-behavior: $\lim_{x \to \infty} f(x) = \infty$	

		5. $g(x) = \frac{1}{2}(\sqrt{4 - x})|2x - 4| + 1$
Domain: $(-\infty, 4]$	Absolute max/min value(s): **Abs Min value = 1**	
Local max/min value(s) that are NOT absolute: **Relative MAX value 2.089.**		
Increasing: $(2, 3.333)$	Decreasing: $(-\infty, 2) \cup (3.333, 4)$	
Left End-behavior: $\lim_{x \to -\infty} f(x) = \infty$	Right End-behavior: $\lim_{x \to \infty} f(x) = $ **N/A**	

		6. $f(x) = \frac{x^2 - 4}{|x - 2|}$
Domain: $(-\infty, 2) \cup (2, \infty)$	Absolute max/min value(s): **NONE**	
Extrema: (list the type) **NONE**		
Increasing: $(2, \infty)$	Decreasing: $(-\infty, 2)$	
Left End-behavior: $\lim_{x \to -\infty} f(x) = \infty$	Right End-behavior: $\lim_{x \to \infty} f(x) = \infty$	

		7. $f(x) = \frac{x^2 - 1}{\sqrt{x^2 - 9}}$
Domain: $(-\infty, -3) \cup (3, \infty)$	Absolute max/min value(s): **Abs MIN value = 5.657**	
Extrema: (list the type) **No other relative extrema.**		
Increasing: $(-4.123, -3) \cup$ $(4.123, \infty)$	Decreasing: $(-\infty, -4.123) \cup$ $(3, 4.123)$	
Left End-behavior: $\lim_{x \to -\infty} f(x) = \infty$	Right End-behavior: $\lim_{x \to \infty} f(x) = \infty$	