Free Response Practice #14
Calculator NOT Permitted

The table below shows function values and graphical properties for a cubic polynomial function, $h(x)$, at indicated values or intervals of x.

x	$(-\infty, -3)$	-3	$(-3, -1)$	-1	$(-1, 1)$	1	$(1, \infty)$
$h(x)$	Increasing & Concave Down	3	Decreasing & Concave Down	1	Decreasing & Concave Up	-1	Increasing & Concave Up

Max Min

a. At what x – value(s) does the graph of $h(x)$ reach a relative maximum? At what x – value(s) does the graph of $h(x)$ reach a relative minimum? Justify your answer.

- $h(x)$ reaches a relative max at $x=-3$ b/c $h(x)$ changes from increasing to decreasing at $x=3$ +1
- $h(x)$ reaches a relative min at $x=1$ b/c $h(x)$ changes from decreasing to increasing at $x=1$ +1

b. Is either of the two relative extrema that you mentioned in part (a) an absolute extremum? Justify your answer.

Neither relative extrema are absolute extremum +1
b/c $h(x)$ is cubic so its end behavior is $\lim_{x\to-\infty} h(x) = -\infty$ and $\lim_{x\to\infty} h(x) = \infty$ +1

c. Approximate at what x – value(s) does the graph of $h(x)$ have a point of inflection? Justify your answer.

A function has a point of inflection when the graph changes concavity. +1
$h(x)$'s graph changes from concave down to concave up at $x=-1$ +1
∴ $h(x)$ has a point of inflection at $x=-1$

d. Sketch a possible graph of $h(x)$.

SEE Rubric