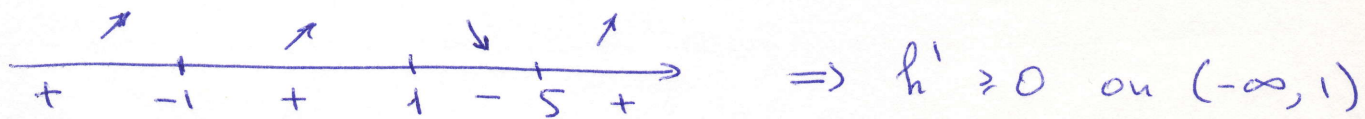


(c) ① Dom $f = \mathbb{R} \setminus \{1\} = (-\infty, 1) \cup (1, \infty)$

②
$$h'(x) = \frac{3(x+1)^2(x-1)^2 - 2(x+1)^3(x-1)}{(x-1)^4} =$$

$$= \frac{(x+1)^2(x-1)(3(x-1) - 2(x+1))}{(x-1)^4} = \frac{(x+1)^2(x-5)}{(x-1)^3}$$



$\Rightarrow h' \geq 0$ on $(-\infty, 1)$

and $(5, \infty)$, $h' < 0$ on $(1, 5) \Rightarrow$

h is increasing on $(-\infty, 1)$ and $(5, \infty)$,

h is decreasing on $(1, 5)$. By first

derivative test h has local minimum

at 5 ($h(5) = 13.5$), h has no local

maxima (note $1 \notin \text{Dom } h$). Since h is

defined on the union of open intervals,

h has no global maxima (otherwise

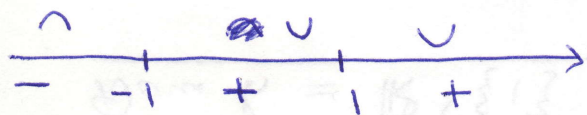
it would local max. as well). Also

$\lim_{x \rightarrow -\infty} h(x) = -\infty$, so $\inf h = -\infty$, hence

h has no global minima

③
$$h''(x) = \frac{2(x+1)(x-5)(x-1)^3 + (x+1)^2(x-1)^3 - 3(x+1)^2(x-5)(x-1)^2}{(x-1)^4} =$$

$$= \frac{(x+1)(2(x-5)(x-1) + (x+1)(x-1) - 3(x+1)(x-5))}{(x-1)^4} = \frac{24(x+1)}{(x-1)^4}$$



Thus f is convex on $(-1, 1)$ and $(1, \infty)$,
 h is concave on $(-\infty, -1)$, the inflection
point is $(-1, 0)$

(4) $\lim_{x \rightarrow a} h(x) = h(a)$ for $\forall a \in \mathbb{D} \cup h$,
 $\lim_{x \rightarrow 1^+} h(x) = \infty$, $\lim_{x \rightarrow 1^-} h(x) = -\infty \Rightarrow$

$x = 1$ is a vertical asymptote

$$\lim_{x \rightarrow \pm\infty} \frac{h(x)}{x} = \lim_{x \rightarrow \pm\infty} \frac{x^3 + 3x^2 + 3x + 1}{x^3 - 2x^2 + x} = 1$$

$$\lim_{x \rightarrow \pm\infty} (h(x) - x) = \lim_{x \rightarrow \pm\infty} \frac{5x^2 + 2x + 1}{x^2 - 2x + 1} = 5 \quad \text{Thus}$$

$y = x + 5$ is a slant asymptote (at ∞ and $-\infty$)

\Rightarrow No horizontal asymptotes

