CALCULUS

Problems involving horizontal asymptotes

NEW

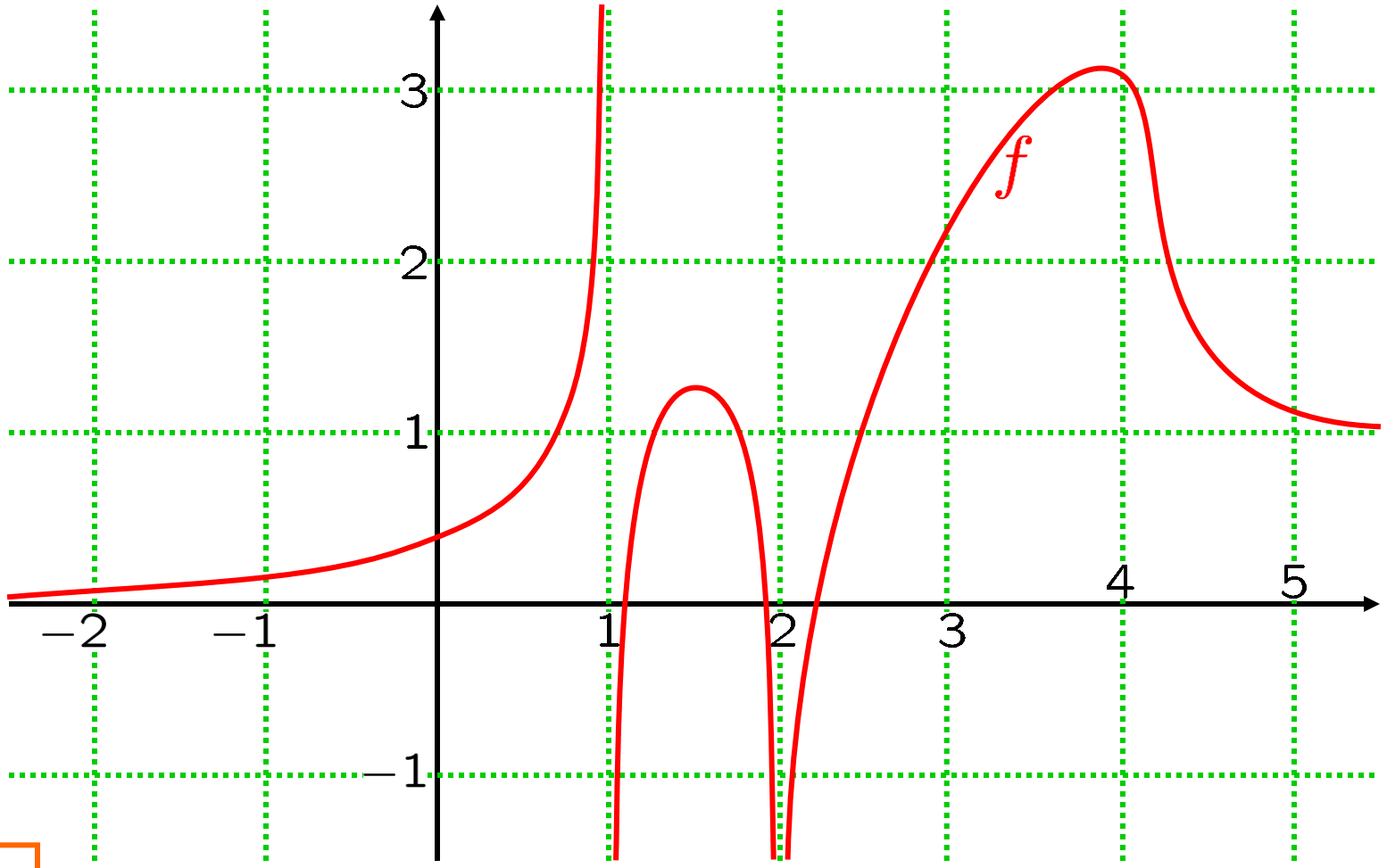
WARNING: In this homework, do NOT use l'Hôpital's rule. It has not been covered yet.

0250-1. Using the graph below of f,

NEW

find these limits: a. $\lim_{x \to -\infty} f(x)$ b. $\lim_{x \to 1^-} f(x)$

c. $\lim_{x \to 1^+} f(x)$ d. $\lim_{x \to 2} f(x)$ e. $\lim_{x \to \infty} f(x)$



0250-2.
NEW

Sketch a graph of a function $h : \mathbb{R} \to \mathbb{R}$ s.t.

h is even, *i.e.*, $h(-x) = h(x)$,

$\lim_{x \to -\infty} h(x) = 0$, $\lim_{x \to -3} h(x) = \infty$,

$\lim_{x \to -2^-} h(x) = -\infty$, $h(-2) = \lim_{x \to -2^+} h(x) = 1$,

$\lim_{x \to 0} h(x) = 2$ and $h(0) = 2$.

0250-3.
NEW

Sketch a graph of a function $h : \mathbb{R} \to \mathbb{R}$ s.t.

h is odd, *i.e.*, $h(-x) = -(h(x))$,

$\lim_{x \to -\infty} h(x) = 2$, $\lim_{x \to -3} h(x) = \infty$,

$\lim_{x \to -2^-} h(x) = -\infty$, $h(-2) = \lim_{x \to -2^+} h(x) = 1$,

$\lim_{x \to -1} h(x) = -\infty$ and $h(1) = -1$.

NEW

0250-4. Compute

a. $\lim_{x\to\infty} \dfrac{x^3+2x-1}{5x^3-7}$

Do NOT use l'Hôpital's rule.

b. $\lim_{x\to\infty} \dfrac{x^4+1000000}{-x^4+1}$

Do NOT use l'Hôpital's rule.

c. $\lim_{x\to\infty} \dfrac{2x+1000000}{x^3-3}$

Do NOT use l'Hôpital's rule.

d. $\lim_{x\to\infty} \dfrac{8x^4+1}{4x^3+1000000}$

Do NOT use l'Hôpital's rule.

NEW

0250-5. Compute

a. $\lim_{x \to -\infty} \dfrac{x^3 + 2x - 1}{5x^3 - 7}$ Do NOT use l'Hôpital's rule.

b. $\lim_{x \to -\infty} \dfrac{x^4 + 1000000}{-x^4 + 1}$ Do NOT use l'Hôpital's rule.

c. $\lim_{x \to -\infty} \dfrac{2x + 1000000}{x^3 - 3}$ Do NOT use l'Hôpital's rule.

d. $\lim_{x \to -\infty} \dfrac{8x^4 + 1}{4x^3 + 1000000}$ Do NOT use l'Hôpital's rule.

NOTE: These are limits at $-\infty$; in the last problem, they were at ∞.

0250-6. Compute

NEW

a. $\lim_{x \to -\infty} \sqrt[3]{\dfrac{54x^3 + 2}{-2x^3 + 3x - 4}}$

Do NOT use l'Hôpital's rule.

b. $\lim_{x \to \infty} \sqrt[5]{\dfrac{-96x^4 - 2x^3 + 1}{2 + 5x - 3x^4}}$

Do NOT use l'Hôpital's rule.

c. $\lim_{x \to -\infty} \dfrac{\sqrt{36x^6 + 8x^2 - x}}{x^3 - 4x^2 + 5}$

Do NOT use l'Hôpital's rule.

d. $\lim_{x \to -\infty} \left(\sqrt{x^4 + 8x + 4} - \sqrt{x^4 + 6x - 3} \right)$

Do NOT use l'Hôpital's rule.

NEW

0250-7. Find the (maximal) intervals where $x^2(x-1)^3(x-2)^2$ is positive and negative,

then compute $\lim_{x \to -\infty} x^2(x-1)^3(x-2)^2$,

then compute $\lim_{x \to \infty} x^2(x-1)^3(x-2)^2$.

NEW 0250-8. Suppose, $\forall x < 100$, that

$$\frac{\sqrt{3x^3 - 2x^2 - 8}}{-2x^3 + 5x + 7} < f(x) < \frac{\sqrt{3x^4 - 16x^3 - 48x}}{-2x^4 + 10x + 30}.$$

Compute $\lim_{x \to -\infty} f(x)$.