

MATH 2554 : 2.4-2.5 Review Sheet

Some Problems From this section I recommend

- Section 2.4 : 29, 38
- Section 2.5 : 31, 46, **78**

Especially important ones in **bold**

Key Concepts

Key take away : Remember that vertical asymptotes $x = a$ occur when $\lim_{x \rightarrow a} f(x) = \pm\infty$, $\lim_{x \rightarrow a^-} f(x) = \pm\infty$, or $\lim_{x \rightarrow a^+} f(x) = \pm\infty$ while a horizontal asymptote $y = L$ occurs at $\lim_{x \rightarrow -\infty} f(x) = L$ or $\lim_{x \rightarrow \infty} f(x) = L$

Analyzing infinite limits :

"Because the numerator \rightarrow _____ while the denominator $\rightarrow 0$ and is (+ or -) and since ($\frac{+or-}{+or-} = +or-$) then the $\lim_{x \rightarrow a} f(x) = +\infty$ or $-\infty$."

DEFINITION One-Sided Infinite Limits

Suppose f is defined for all x near a with $x > a$. If $f(x)$ becomes arbitrarily large for all x sufficiently close to a with $x > a$, we write $\lim_{x \rightarrow a^+} f(x) = \infty$ (Figure 2.26a).

The one-sided infinite limits $\lim_{x \rightarrow a^+} f(x) = -\infty$ (Figure 2.26b), $\lim_{x \rightarrow a^-} f(x) = \infty$ (Figure 2.26c), and $\lim_{x \rightarrow a^-} f(x) = -\infty$ (Figure 2.26d) are defined analogously.

DEFINITION Vertical Asymptote

If $\lim_{x \rightarrow a} f(x) = \pm\infty$, $\lim_{x \rightarrow a^+} f(x) = \pm\infty$, or $\lim_{x \rightarrow a^-} f(x) = \pm\infty$, the line $x = a$ is called a **vertical asymptote** of f .