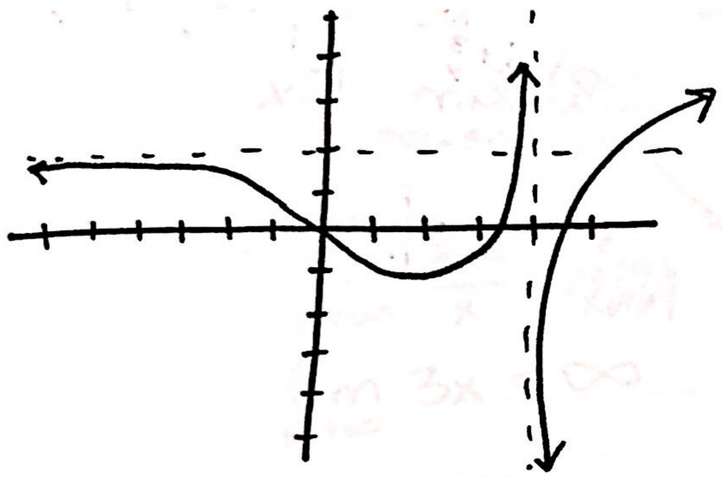
AP Calculus AB
Limits at Infinity
H: 1.1-8

Name: Key

Find the limit using the graph.



$\lim_{x \to 2} f(x) = \underline{-1}$

$\lim_{x \to 4^-} f(x) = \underline{\infty}$

$\lim_{x \to -\infty} f(x) = \underline{2}$

$\lim_{x \to 4^+} f(x) = \underline{-\infty}$

$\lim_{x \to \infty} f(x) = \underline{\infty}$

Find the limit without using a calculator.

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

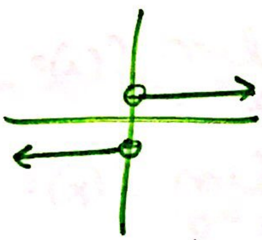
$= \dfrac{3}{1} = \boxed{3}$

2) $\lim_{x \to -\infty} \dfrac{3x^2 - x + 5}{x^2 - 4}$

$= \dfrac{3}{1} = \boxed{3}$

3) $\lim_{x \to \infty} \dfrac{|x|}{x}$

$= \boxed{1}$



4) $\lim_{x \to -\infty} \dfrac{x-2}{2x^2 + 3x - 5}$

$= \boxed{0}$

5) $\lim_{x\to\infty} \dfrac{4x^3-2x+1}{x^2-2x+1}$

$\dfrac{4x^3}{x^2} = 4x \quad \boxed{\infty}$

6) $\lim_{x\to-\infty} \dfrac{\sqrt{5x^2-2}}{x+3}$

$= \dfrac{\frac{\sqrt{5x^2-2}}{-\sqrt{x^2}}}{\frac{x+3}{x}} = \dfrac{-\sqrt{\frac{5x^2}{x^2}-\frac{2}{x^2}}}{\frac{x+3}{x}} = \dfrac{-\sqrt{5-\frac{2}{x^2}}}{\frac{x}{x}+\frac{3}{x}}$

$= \dfrac{-\sqrt{5-\frac{2}{x^2}}}{1+\frac{3}{x}} = \dfrac{-\sqrt{5}}{1} = \boxed{-\sqrt{5}}$

7) $\lim_{x\to\infty} \dfrac{x^4}{4x^6+2x^2-4}$

$= \boxed{0}$

8) $\lim_{x\to-\infty} 12x$

$= \boxed{-\infty}$

9) $\lim_{x\to\infty} \dfrac{\sqrt{2x^2+1}}{4x+2}$

$= \dfrac{\frac{\sqrt{2x^2+1}}{\sqrt{x^2}}}{\frac{4x+2}{x}} = \dfrac{\sqrt{\frac{2x^2}{x^2}+\frac{1}{x^2}}}{\frac{4x}{x}+\frac{2}{x}} = \dfrac{\sqrt{2+\frac{1}{x^2}}}{4+\frac{2}{x}} = \boxed{\dfrac{\sqrt{2}}{4}}$

10) $\lim_{x\to\infty} \cos(2x)$

DNE

(oscillating)

11) $\lim_{x\to-\infty} \dfrac{\sin 2x}{3x}$

$= \boxed{0}$

12) $\lim_{x\to-\infty} x^3-4x^2+5$

$\boxed{-\infty}$

13) $f(x) = \begin{cases} \dfrac{3x}{x+1}, & x \le 0 \\ \dfrac{1}{x^2}, & x > 0 \end{cases}$

$\lim_{x\to\infty} f(x) = \underline{\ 0\ }$

$\lim_{x\to-\infty} f(x) = \underline{\ \frac{3}{1} = \boxed{3}\ }$

$\lim_{x\to0^-} f(x) = \underline{\ 0\ }$

$\lim_{x\to0^+} f(x) = \underline{\ \infty\ }$

x	y
3	1/9
2	1/4
1	1