

WS: Limits of Infinity HW

Exer. 1-10: For the given $f(x)$, express each of the following limits as ∞ , $-\infty$, or DNE (Does Not Exist):

(a) $\lim_{x \rightarrow a^-} f(x)$ (b) $\lim_{x \rightarrow a^+} f(x)$ (c) $\lim_{x \rightarrow a} f(x)$

1 $f(x) = \frac{5}{x-4}$; $a = 4$

2 $f(x) = \frac{5}{4-x}$; $a = 4$

3 $f(x) = \frac{8}{(2x+5)^3}$; $a = -\frac{5}{2}$

4 $f(x) = \frac{-4}{7x+3}$; $a = -\frac{3}{7}$

5 $f(x) = \frac{3x}{(x+8)^2}$; $a = -8$

6 $f(x) = \frac{3x^2}{(2x-9)^2}$; $a = \frac{9}{2}$

7 $f(x) = \frac{2x^2}{x^2-x-2}$; $a = -1$

8 $f(x) = \frac{4x}{x^2-4x+3}$; $a = 1$

9 $f(x) = \frac{1}{x(x-3)^2}$; $a = 3$

10 $f(x) = \frac{-1}{(x+1)^2}$; $a = -1$

ODDS #1-9

Evens #38-40

Do All #11-24

Exer. 11-24: Find the limit, if it exists.

11 $\lim_{x \rightarrow \infty} \frac{5x^2 - 3x + 1}{2x^2 + 4x - 7}$

12 $\lim_{x \rightarrow \infty} \frac{3x^3 - x + 1}{6x^3 + 2x^2 - 7}$

13 $\lim_{x \rightarrow -\infty} \frac{4-7x}{2+3x}$

14 $\lim_{x \rightarrow -\infty} \frac{(3x+4)(x-1)}{(2x+7)(x+2)}$

15 $\lim_{x \rightarrow -\infty} \frac{2x^2 - 3}{4x^3 + 5x}$

16 $\lim_{x \rightarrow \infty} \frac{2x^2 - x + 3}{x^3 + 1}$

17 $\lim_{x \rightarrow \infty} \frac{-x^3 + 2x}{2x^2 - 3}$

18 $\lim_{x \rightarrow -\infty} \frac{x^2 + 2}{x - 1}$

19 $\lim_{x \rightarrow -\infty} \frac{2-x^2}{x+3}$

20 $\lim_{x \rightarrow \infty} \frac{3x^4 + x + 1}{x^2 - 5}$

21 $\lim_{x \rightarrow \infty} \sqrt[3]{\frac{8+x^2}{x(x+1)}}$

22 $\lim_{x \rightarrow -\infty} \frac{4x-3}{\sqrt{x^2+1}}$

23 $\lim_{x \rightarrow \infty} \sin x$

24 $\lim_{x \rightarrow \infty} \cos x$

Also do Back of WS: Limits 7.1

Exer. 37-40: A function f satisfies the given conditions. Sketch a possible graph for f , assuming that it does not cross a horizontal asymptote.

37 $\lim_{x \rightarrow -\infty} f(x) = 1$; $\lim_{x \rightarrow \infty} f(x) = 1$;

$\lim_{x \rightarrow 3^-} f(x) = -\infty$; $\lim_{x \rightarrow 3^+} f(x) = \infty$

38 $\lim_{x \rightarrow -\infty} f(x) = -1$; $\lim_{x \rightarrow \infty} f(x) = -1$;

$\lim_{x \rightarrow 2^-} f(x) = \infty$; $\lim_{x \rightarrow 2^+} f(x) = -\infty$

39 $\lim_{x \rightarrow -\infty} f(x) = -2$; $\lim_{x \rightarrow \infty} f(x) = -2$;

$\lim_{x \rightarrow 3^-} f(x) = \infty$; $\lim_{x \rightarrow 3^+} f(x) = -\infty$;

$\lim_{x \rightarrow -1^-} f(x) = -\infty$; $\lim_{x \rightarrow -1^+} f(x) = \infty$

40 $\lim_{x \rightarrow -\infty} f(x) = 3$; $\lim_{x \rightarrow \infty} f(x) = 3$;

$\lim_{x \rightarrow 1^-} f(x) = \infty$; $\lim_{x \rightarrow 1^+} f(x) = -\infty$;

$\lim_{x \rightarrow -2^-} f(x) = -\infty$; $\lim_{x \rightarrow -2^+} f(x) = \infty$

Answers

1 (a) $-\infty$ (b) ∞ (c) DNE

3 (a) $-\infty$ (b) ∞ (c) DNE

5 (a) $-\infty$ (b) $-\infty$ (c) $-\infty$

7 (a) ∞ (b) $-\infty$ (c) DNE

9 (a) ∞ (b) ∞ (c) ∞ 11 $\frac{5}{2}$ 13 $\frac{7}{3}$

15 0 17 $-\infty$ 19 ∞ 21 1 23 DNE

25 0.996664442, 0.999966666, 0.999996666, 0.999999666, 0.999999966; the limit appears to be 1.

27 $x = -2, x = 2; y = 0$ 29 None; $y = 2$

31 $x = -3, x = 0, x = 2; y = 0$

33 $x = -3, x = 1; y = 1$ 35 $x = 4; y = 0$

37

39

