Find the limit of the functions that involve e^x

3. $\lim_{x\to\infty} \frac{e^{-x}}{x} = \frac{1}{xe^x} = 0$ (Horizontal Asy)

$\lim_{x\to-\infty} \frac{e^{-x}}{x} = -\infty$

A) $\lim_{x\to\infty} \frac{e^x+2x}{2x} = \infty$

$\lim_{x\to\infty} \frac{e^x+2x}{2x}$

$\lim_{x\to\infty} \frac{e^x}{2x} + \frac{2x}{2x}$

B) $\lim_{x\to-\infty} \frac{e^x+2x}{2x} =$ (Horizontal Asy)

$\lim_{x\to-\infty} \frac{e^x+2x}{2x}$

$\lim_{x\to\infty} \frac{e^x}{2x} + \frac{2x}{2x} = 0 + 1 = 1$

Find the limit of the functions that involve sine and cosine

C) $\lim_{x\to-\infty} \frac{x^3+\cos x}{x^3}$

$\lim_{x\to-\infty} \frac{x^3}{x^3} + \frac{\cos x}{x^3}$

$1 + 0$

1

D) $\lim_{x\to+\infty} \frac{x^3+\cos x}{x^3}$

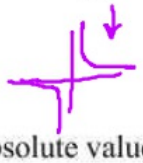
$\lim_{x\to+\infty} \frac{x^3}{x^3} + \frac{\cos x}{x^3}$

$1 + 0 = 1$

E) $\lim_{x\to\infty} \sin\left(\frac{1}{x}\right)$

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

F) $\lim_{x\to\infty} \frac{\sin\left(\frac{1}{x}\right)}{1+\frac{1}{x}} = \frac{\sin(0)}{1+0} = \frac{0}{1} = 0$



Find the limit of the functions that involve absolute value

8A) $\lim_{x\to\infty} \frac{5x-2}{|x|-1} = \frac{5x-2}{x-1} = 5$

8B) $\lim_{x\to-\infty} \frac{5x-2}{|x|-1} = -5$

H.A $y = 5, -5$

53A) Find the limit of f(x) as

a) $x \to -\infty$, b) $x \to \infty$, c) $x \to 0^+$, d) $x \to 0^-$ e) $x \to 1^-$ f) $x \to 1^+$

a) $\lim_{x \to -\infty} \frac{3x-1}{2x+5} = \frac{3}{2}$

b) $\lim_{x \to \infty} \frac{2}{x-1} = 0$

c) $\lim_{x \to 0^+} \frac{2}{x-1} = \frac{2}{0-1} = -2$

d) $\lim_{x \to 0^-} \frac{3x-1}{2x+5} = -\frac{1}{5}$

e) $\lim_{x \to 1^-} \frac{2}{x-1} = \frac{2}{0} \to -\infty$

$x = .9 \quad y = \frac{2}{-.1}$

f) $\lim_{x \to 1^+} \frac{2}{x-1} = \frac{2}{0} \to \infty$

$x = 1.1 \quad y = \frac{2}{.1}$

$*$ If $f(x) = \begin{cases} \frac{3x-1}{2x+5} & x < 0 \\ \frac{2}{x-1} & x \geq 0 \end{cases}$ Left of $x=0$ / Right of $x=0$

55A) Sketch a graph of a function that satisfies the following conditions

$\lim_{x \to 0} f(x) = 2$ ← (0,2)

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

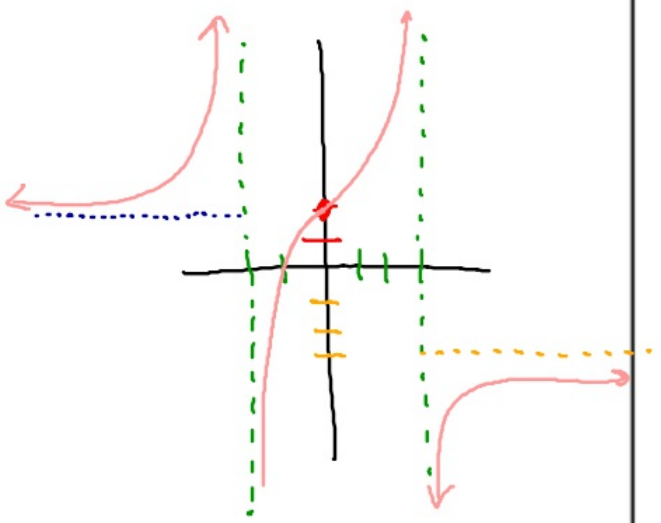
$\lim_{x \to -2^+} f(x) = -\infty$ ← V.A. $x=-2$

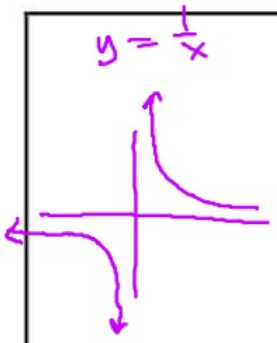
$\lim_{x \to -\infty} f(x) = 2$ ← H.A. $y=2$

$\lim_{x \to \infty} f(x) = -3$ ← H.A. $y=-3$

$\lim_{x \to 3^-} f(x) = \infty$

$\lim_{x \to 3^+} f(x) = -\infty$ ← V.A. $x=3$





Find the limit of the functions using the sandwich theorem

*Example*9 (p.65)

$$\lim_{x\to 0}\left[x^2 \sin\left(\frac{1}{x}\right)\right]$$

$\sin\left(\frac{1}{x}\right)$ → $-\infty$ or ∞

Between -1 and 1

x^2 → 0

$\lim_{x\to 0} x^2 \sin\left(\frac{1}{x}\right) = 0$

p.76

10) $\lim_{x\to\infty} \frac{1-\cos x}{x^2} = 0$

12) $\lim_{x\to\infty} \frac{\sin x^2}{x} = 0$