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$$9) \lim_{x \rightarrow \infty} \frac{1 - \cos x}{x^2} = \boxed{0} \quad \frac{x^2}{x^2} \quad 0 \leq \frac{1 - \cos x}{x^2} \leq \frac{2}{x^2}$$

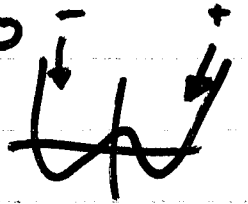
$$\lim_{x \rightarrow \infty} 0 = 0$$

$$\lim_{x \rightarrow \infty} \frac{2}{x^2} = 0$$

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

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

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



$$13) \lim_{x \rightarrow 2^+} \frac{1}{x-2} = \infty$$

$$21) \lim_{x \rightarrow \infty} \left(2 - \frac{x}{x+1}\right) \left(\frac{x^2}{5+x^2}\right)$$

$$\lim_{x \rightarrow \infty} \left(2 - \frac{x}{x+1}\right) \cdot \lim_{x \rightarrow \infty} \frac{x^2}{5+x^2}$$

$$\left[\lim_{x \rightarrow \infty} 2 - \lim_{x \rightarrow \infty} \frac{x}{x+1} \right] \cdot \lim_{x \rightarrow \infty} \frac{x^2}{5+x^2}$$

$$[2 - 1] \cdot 1 = \boxed{1}$$

$$\lim_{x \rightarrow \infty} \left(2 - \frac{x}{x+1}\right) \left(\frac{x^2}{5+x^2}\right)$$

$$(2 - 1)(1) = \boxed{1}$$

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$$22) \lim_{x \rightarrow \infty} \left(\frac{2}{x} + 1 \right) \left(\frac{5x^2 - 1}{x^2} \right)$$

$$(0 + 1)(5) = \boxed{5}$$

$$\lim_{x \rightarrow -\infty} \left(\frac{2}{x} + 1 \right) \left(\frac{5x^2 - 1}{x^2} \right)$$

$$(0 + 1)(5) = \boxed{5}$$

$$27) f(x) = \frac{1}{x^2 - 4} \quad \text{vertical asymptotes } x^2 - 4 = 0$$

$$x = \pm 2$$

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

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

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

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

$$39) f(x) = 3x^2 - 2x + 1 \quad 3x^2$$

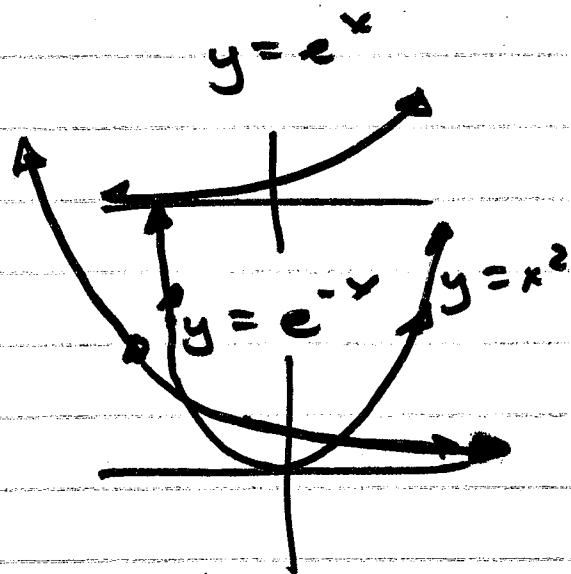
$$\lim_{x \rightarrow \infty} 3x^2 - 2x + 1 = \infty$$

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

$$46) y = x^2 + e^{-x}$$

$$e^{-x} \rightarrow 0 \quad e^{-x}$$

$$e^{-x} \rightarrow 0 \quad x^2$$



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49/ $\lim_{x \rightarrow \infty} x e^x = \infty$

$\lim_{x \rightarrow -\infty} x e^x$

$-\infty \cdot 0 = \boxed{0}$

$\lim_{x \rightarrow \infty} \frac{1}{x} e^{\frac{1}{x}}$

$\lim_{x \rightarrow \infty} \frac{e^{\frac{1}{x}}}{x}$

$\lim_{x \rightarrow \infty} \frac{1}{x} e^{\frac{1}{x}}$
 $\lim_{x \rightarrow \infty} \frac{e^{\frac{1}{x}}}{x}$