Actividad 1 correspondiente a la Unidad 3

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Instrucciones: Calcula cada uno de los siguientes límites: Recuerda que sólo puredes usar la regla de L'Hopital cuando tienes una indeterminación de cociente.

5. $\lim_{x\to -2} \frac{x^2-1}{x^2-x}$

$$\lim_{x\to -2} \frac{(-2)^2-1}{(-2)^2-(-2)}$$

$$=\frac{(-2)^2-1}{(-2)^2-(-2)}$$

$$=\frac{3}{6}$$

$$=\frac{1}{2}$$

7. $\lim_{x\to 1} \frac{x^9-1}{x^5-1}$

$$\lim_{x\to 1} \frac{9x^8}{5x^4}$$

$$\lim_{x\to 1} \frac{9x^4}{5}$$

$$=\frac{9(1)^4}{5}$$

$$=\frac{9}{5}$$

9. $\lim_{x\to(\pi/2)^+} \dfrac{\cos x}{1 - \operatorname{sen} x}$

$$\lim_{x\to\frac{\pi}{2}} \frac{-sen\, x}{-cosx}$$

$$\lim_{x\to\frac{\pi}{2}} tanx$$

$$= tan\frac{\pi}{2}$$

$$= -\infty$$

11. $\lim_{t\to 0} \dfrac{e^t - 1}{t^3}$

$$\lim_{t\to 0} \frac{e^t}{3t^2}$$

$$\lim_{t\to 0} e^t * \lim_{t\to 0} \frac{1}{3t^2}$$

$$= 1 * \infty$$

$$= \infty$$

13. $\lim_{x\to 0} \dfrac{\tan px}{\tan qx}$

$$\lim_{x\to 0} \frac{psec^2(px)}{qsec^2(qx)}$$

$$\frac{p}{q}\lim_{x\to 0} \frac{sec^2(px)}{sec^2(qx)}$$

$$= \frac{p}{q}\frac{sec^2(p(0))}{sec^2(q(0))}$$

$$= \frac{p}{q}(1)$$

$$= \frac{p}{q}$$

15. $\lim_{x\to\infty} \frac{\ln x}{\sqrt{x}}$

$$\lim_{x\to\infty} \frac{\frac{1}{x}}{\frac{1}{2\sqrt{x}}}$$

$$\lim_{x\to\infty} \frac{2}{\sqrt{x}}$$

$$= \frac{2}{\sqrt{\infty}}$$

$$= \frac{2}{\sqrt{\infty}}$$

$$= 0$$

17. $\lim_{x\to 0^+} \frac{\ln x}{x}$

$$\lim_{x\to 0} \frac{\frac{1}{x}}{1}$$

$$\lim_{x\to 0} \frac{1}{x}$$

$$= -\infty$$

19. $\lim_{x\to\infty} \frac{e^x}{x^3}$

$$\lim_{x\to\infty} \frac{e^x}{3x^2}$$

$$\lim_{x\to\infty} \frac{e^x}{3x^2}$$

$$\lim_{x\to\infty} \frac{e^x}{6x}$$

$$\lim_{x\to\infty}\frac{e^x}{6}$$

$$=\infty$$

21. $\lim_{x\to 0}\dfrac{e^x-1-x}{x^2}$

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

$$\lim_{x\to 0}\frac{e^x}{2}$$

$$=\frac{1}{2}$$

23. $\lim_{x\to 0}\dfrac{\tanh x}{\tan x}$

$$\lim_{x\to 0}\frac{sech^2x}{sec^2x}$$

$$=\frac{sech^20}{sec^20}$$

$$=\frac{1}{1}$$

$$=1$$

25. $\lim_{t\to 0}\dfrac{5^t-3^t}{t}$

$$\lim_{t\to 0}\frac{5^t\ln(5)-3^t\ln(3)}{1}$$

$$=5^0\ln(5)-3^0\ln(3)$$

$$=\ln(5)-\ln(3)$$

$$=\ln\left(\frac{5}{3}\right)$$

27. $\lim_{x\to 0} \frac{\text{sen}^{-1} x}{x}$

$$\lim_{x\to 0} \frac{\frac{1}{\sqrt{1-x^2}}}{1}$$

$$= \frac{1}{\sqrt{1-(0)^2}}$$

$$= \frac{1}{\sqrt{1}}$$

$$= 1$$

29. $\lim_{x\to 0} \frac{1-\cos x}{x^2}$

$$\lim_{x\to 0} \frac{senx}{2x}$$

$$\lim_{x\to 0} \frac{cosx}{2}$$

$$= \frac{\cos(0)}{2}$$

$$= \frac{1}{2}$$

31. $\lim_{x\to 0} \frac{x+\text{sen}\, x}{x+\cos x}$

$$= \frac{0+sen(0)}{0+\cos(0)}$$

$$= \frac{0}{1}$$

$$= 0$$

33. $\lim_{x\to 1} \dfrac{1 - x + \ln x}{1 + \cos \pi x}$

$$\lim_{x\to 0} \frac{\frac{-x+1}{x}}{-\pi \text{sen}(\pi x)}$$

$$\lim_{x\to 0} \frac{(-\pi \text{sen}(\pi x))(1-x)}{x}$$

$$= \frac{(-\pi \text{sen}(\pi))(1-1)}{1}$$

$$= 0$$

35. $\lim_{x\to 1} \dfrac{x^a - ax + a - 1}{(x-1)^2}$

$$\lim_{x\to 1} \frac{ax - a}{2(x-1)}$$

$$\lim_{x\to 1} \frac{a(x-1)}{2(x-1)}$$

$$\lim_{x\to 1} \frac{a}{2}$$

$$= \frac{a}{2}$$

37. $\lim_{x\to 0} \dfrac{\cos x - 1 + \frac{1}{2}x^2}{x^4}$

$$\lim_{x\to 0} \frac{x - sen\, x}{4x^3}$$

$$\lim_{x\to 0} \frac{1 - cos\, x}{12x^2}$$

$$\lim_{x\to 0} \frac{sen\, x}{24x}$$

$$\lim_{x\to 0} \frac{cos\, x}{24}$$

$$= \frac{cos\ (0)}{24}$$

$$= \frac{1}{24}$$

39. $\lim_{x \to \infty} x \operatorname{sen}(\pi/x)$

$$\lim_{x \to \infty} \frac{sen\ \frac{\pi}{x}}{\frac{1}{x}}$$

$$\lim_{x \to \infty} \frac{-\frac{\pi}{x^2} cos\ \frac{\pi}{x}}{-\frac{1}{x^2}}$$

$$\lim_{x \to \infty} \pi cos\ \frac{\pi}{x}$$

$$= \pi(1)$$

$$= \pi$$

41. $\lim_{x \to 0} \cot 2x\ \operatorname{sen} 6x$

$$\lim_{x \to 0} \frac{sen\ 6x}{tan\ 2x}$$

$$\lim_{x \to 0} \frac{6cos\ 6x}{2sec^2\ 2x}$$

$$\lim_{x \to 0} \frac{3cos\ 6x}{sec^2\ 2x}$$

$$= \frac{3cos\ 6(0)}{sec^2\ 2(0)}$$

$$= 3$$

43. $\lim_{x\to\infty} x^3 e^{-x^2}$

$$\lim_{x\to\infty} \frac{x^3}{\frac{1}{e^{-x^2}}}$$

$$\lim_{x\to\infty} \frac{3x^2}{e^{x^2}2x}$$

$$\lim_{x\to\infty} \frac{3x}{e^{x^2}2}$$

$$\lim_{x\to\infty} \frac{3}{4xe^{x^2}}$$

$$\frac{3}{4}\lim_{x\to\infty} \frac{1}{xe^{x^2}}$$

$$= \frac{3}{4} * \frac{1}{\infty}$$

$$= 0$$