Práctica #1

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Cálculo 1
3-750-1980

1) $\lim_{x\to 3} \sqrt{x+1} = \sqrt{3+1} = \sqrt{4} = 2$

2) $\lim_{x\to 1} \frac{2x-3}{x+5} = \frac{2(1)-3}{1+5} = \frac{2-3}{6} = \frac{-1}{6}$

3) $\lim_{x\to 2} \frac{\sqrt{x+2}}{x-4} = \frac{\sqrt{2+2}}{2-4} = \frac{2}{-2} = -1$

4) $\lim_{x\to 3} \frac{3-x}{x^2-9} = \lim_{x\to 3} \frac{3-x}{(x-3)(x+3)} = \lim_{x\to 3} \frac{\cancel{3-x}}{\cancel{(3-x)}(x+3)} = \lim_{x\to 3} \frac{1}{x+3} = \frac{1}{6}$

5) $\lim_{x\to 4} \frac{x^2-5x+4}{x^2-2x-8} = \lim_{x\to 4} \frac{\cancel{(x-4)}(x-1)}{\cancel{(x-4)}(x+2)} = \lim_{x\to 4} \frac{x-1}{x+2} = \frac{4-1}{4+2} = \frac{3}{6} = \frac{1}{2}$

6) $\lim_{x\to 3} \frac{\sqrt{x+1}-2}{x-3} = \lim_{x\to 3} \frac{\sqrt{x+1}-2}{x-3} \cdot \frac{\sqrt{x+1}+2}{\sqrt{x+1}+2} = \lim_{x\to 3} \frac{x+1-4}{(x-3)(\sqrt{x+1}+2)} = \lim_{x\to 3} \frac{\cancel{x-3}}{\cancel{(x-3)}(\sqrt{x+1}+2)}$

$= \lim_{x\to 3} \frac{1}{\sqrt{x+1}+2} = \frac{1}{\sqrt{3+1}+2} = \frac{1}{2+2} = \frac{1}{4}$

7) $\lim_{x\to 0} \frac{\sqrt{2+x}-\sqrt{2}}{x} = \lim_{x\to 0} \frac{\sqrt{2+x}-\sqrt{2}}{x} \cdot \frac{\sqrt{2+x}+\sqrt{2}}{\sqrt{2+x}+\sqrt{2}} = \lim_{x\to 0} \frac{2+x-2}{x(\sqrt{2+x}+\sqrt{2})} = \lim_{x\to 0} \frac{\cancel{x}}{\cancel{x}(\sqrt{2+x}+\sqrt{2})}$

$\lim_{x\to 0} \frac{1}{\sqrt{2+x}+\sqrt{2}} = \frac{1}{\sqrt{2+0}+\sqrt{2}} = \frac{1}{\sqrt{2}+\sqrt{2}} = \frac{1}{2\sqrt{2}} \cdot \frac{2\sqrt{2}}{2\sqrt{2}} = \frac{2\sqrt{2}}{4(2)} = \frac{\cancel{2}\sqrt{2}}{\cancel{8}} = \frac{\sqrt{2}}{4}$

8) $\lim_{x\to 0} \frac{\frac{1}{x+4} - \frac{1}{4}}{x} = \lim_{x\to 0} \frac{\frac{4-x-4}{4x+16}}{x} = \lim_{x\to 0} \frac{\frac{-x}{4x+16}}{x} = \lim_{x\to 0} \frac{\cancel{-x}}{\cancel{x}(4x+16)}$

$= \lim_{x\to 0} \frac{-1}{4x+16} = \frac{-1}{4(0)+16} = \frac{-1}{16}$

9) $\lim_{y \to -2} \frac{y^3+8}{y+2} = \lim_{x \to -2} \frac{\cancel{(y+2)}(y^2-(y)(2)+4)}{\cancel{y+2}} = \lim_{x \to 2} y^2-2y+4 = (-2)^2-2(-2)+4$

$= 4+4+4 = 12$

10) $\lim_{x \to 0} \frac{\sqrt{h+2}-\sqrt{2}}{h} = \lim_{x \to 0} \frac{\sqrt{h+2}-\sqrt{2}}{h} \cdot \frac{\sqrt{h+2}+\sqrt{2}}{\sqrt{h+2}+\sqrt{2}} = \lim_{x \to 0} \frac{h+2-2}{h(\sqrt{h+2}+\sqrt{2})} = \lim_{x \to 0} \frac{\cancel{h}}{\cancel{h}(\sqrt{h+2}+\sqrt{2})}$

$= \lim_{x \to 0} \frac{1}{\sqrt{h+2}+\sqrt{2}} = \frac{1}{\sqrt{0+2}+\sqrt{2}} = \frac{1}{\sqrt{2}+\sqrt{2}} = \frac{1}{2\sqrt{2}} \cdot \frac{2\sqrt{2}}{2\sqrt{2}} = \frac{2\sqrt{2}}{8} = \frac{\sqrt{2}}{4}$

11) $\lim_{x \to 0} \frac{\tan x}{2x} = \lim_{x \to 0} \frac{\frac{\operatorname{sen} x}{\cos x}}{2x} = \lim_{x \to 0} \frac{\operatorname{sen} x}{2x \cos x} = \lim_{x \to 0} \frac{\operatorname{sen} x}{2x} \cdot \frac{1}{\cos x} =$

$\left(\lim_{x \to 0} \frac{\operatorname{sen} x}{2x}\right)\left(\lim_{x \to 0} \frac{1}{\cos x}\right) = \frac{1}{2}\left(\lim_{x \to 0} \frac{\operatorname{sen} x}{x}\right)\left(\lim_{x \to 0} \frac{1}{\cos x}\right) = \frac{1}{2} \operatorname{sen}\left(\lim_{x \to 0} \frac{\cancel{x}}{\cancel{x}}\right)\left(\frac{1}{1}\right) = \frac{1}{2} \operatorname{sen}(1) = \frac{1}{2}$

12) $\lim_{\theta \to 0} \frac{\cos\theta \tan\theta}{\theta} = \lim_{\theta \to 0} \frac{\cancel{\cos\theta} \frac{\operatorname{sen}\theta}{\cancel{\cos\theta}}}{\theta} = \lim_{\theta \to 0} \frac{\operatorname{sen}\theta}{\theta} = \operatorname{sen}\left(\lim_{\theta \to 0} \frac{\theta}{\theta}\right) = \operatorname{sen}(1) = 1$

13) $\lim_{x \to 0} \frac{\operatorname{sen} 2x}{\operatorname{sen} 3x} = \lim_{x \to 0} \frac{\frac{\operatorname{sen} 2x}{3x}}{\cancel{\frac{\operatorname{sen} 3x}{3x}}} = \lim_{x \to 0} \frac{\operatorname{sen} 2x}{3x} = \frac{\lim \operatorname{sen} 2x}{3x} = \frac{1}{3} \lim_{x \to 0} \frac{\operatorname{sen} 2x}{x}$

$= \frac{1}{3} \lim_{x \to 0} \frac{2 \operatorname{sen} 2x}{2x} = \frac{2}{3} \lim_{x \to 0} \cancel{\frac{\operatorname{sen} 2x}{2x}} = \frac{2}{3}$

14) $\lim_{x \to 0} \frac{1-\cos^2 x}{2x^2} = \lim_{x \to 0} \frac{\operatorname{sen}^2 x}{2x^2} = \frac{1}{2} \lim_{x \to 0} \cancel{\frac{(\operatorname{sen} x)^2}{x^2}} = \frac{1}{2}$

15) $\lim_{x \to 0} \frac{\operatorname{sen} x}{3x^2+2x} = \lim_{x \to 0} \frac{(\operatorname{sen} x)'}{(3x^2+2x)'} = \lim_{x \to 0} \frac{\cos x}{6x+2} = \frac{\cos(0)}{6(0)+2} = \frac{1}{2}$