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DEBER SEMANA 6 I PARTE

Un obrero levanta con ayuda de una soga, un tablón hasta lo alto de un edificio en construcción. Suponga que el otro extremo del tablón sigue una trayectoria perpendicular a la pared y que el obrero mueve el tablón a razón de 0,15 m/s. ¿a que ritmo se desliza por el suelo el extremo cuando está a 2.5m de la pared? ¿a que razón esta cambiando el ángulo formado por el suelo y el tablón en el mismo instante?

$$x^2 + y^2 = 25$$

$$y = \frac{5\sqrt{3}}{2}$$

$$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$$

$$\frac{dx}{dt} = \frac{y\,dy}{x\,dt} = -\frac{\frac{5\sqrt{3}}{2}}{5/2}\,0.15\sqrt{3} = 0.26 m/s$$

$$sen(\theta) = \frac{y}{5}$$

$$\cos(\theta)\frac{d\theta}{dt} = \frac{1\,dy}{5\,dt}$$

$$\frac{d\theta}{dt} = \frac{dy/dt}{5\cos(\theta)} = \frac{0,15}{5 \cdot \frac{5/2}{5}} = 0,06 rad/seg$$

DEBER SEMANA 6   II PARTE

$$\lim_{x\to 0} \frac{a^x - b^x}{x}$$

$$\frac{\lim_{x\to 0} a^x - b^x}{\lim_{x\to 0} x}$$

$$\frac{\lim_{x\to 0} a^x - \lim_{x\to 0} b^x}{\lim_{x\to 0} x}$$

$$\frac{\lim_{ax\to 0} x - \lim_{x\to 0} b^x}{\lim_{x\to 0} x}$$

$$\frac{\lim_{ax\to 0} 0 \quad \lim_{-bx\to 0} x}{\lim_{x\to 0} x}$$

$$\frac{a^0 - b \lim_{x\to 0} x}{\lim_{x\to 0} x}$$

$$\frac{a^0 - b^0}{\lim_{x\to 0} x}$$

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

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

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

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

$$\frac{0}{0}$$

$$\lim_{x\to 0} \frac{a^x - b^x}{x} = \lim_{x\to 0} \frac{\frac{d}{dx}[a^x - b^x]}{\frac{d}{dx}[x]}$$

$$\lim_{x\to 0} \frac{\frac{d}{dx}[a^x - b^x]}{\frac{d}{dx}[x]}$$

$a^x - b^x$ respecto a x es.

$$\frac{d}{dx}[a^x] + \frac{d}{dx}[-b^x].$$

$$\lim_{x\to 0} \frac{\frac{d}{dx}[a^x] + \frac{d}{dx}[-b^x]}{\frac{d}{dx}[x]}$$

$$\lim_{x\to 0} \frac{a^x \ln(a) + \frac{d}{dx}[-b^x]}{\frac{d}{dx}[x]}$$

Evalue $\frac{d}{dx}[-b^x]$

$$\lim_{x\to 0} \frac{a^x \ln(a) - \frac{d}{dx}[b^x]}{\frac{d}{dx}[x]}$$

$$\lim_{x\to 0} \frac{a^x \ln(a) - (b^x \ln(b))}{\frac{d}{dx}[x]}$$

$$\lim_{x\to 0} \frac{a^x \ln(a) - b^x \ln(b)}{\frac{d}{dx}[x]}$$

nx^{n-1} donde $n=1$.

$$\lim_{x\to 0} \frac{a^x \ln(a) - b^x \ln(b)}{1}$$

$$\lim_{x\to 0} a^x \ln(a) - b^x \ln(b)$$

$$\lim_{x\to 0} a^x \ln(a) - \lim_{x\to 0} b^x \ln(b)$$

$$\ln(a) \lim_{x\to 0} a^x - \lim_{x\to 0} b^x \ln(b)$$

$$\ln(a) \lim_{x\to 0} a^x - \ln(b) \lim_{x\to 0} b^x$$

$$\ln(a) \lim_{x\to 0} a^x - \ln(b) \lim_{x\to 0} b^x$$

$$\ln(a)\, a^0 - \ln(b) \lim_{x\to 0} b^x$$

$$\ln(a)\, a^0 - \ln(b)\, b^0$$

$$\ln(a) - \ln(b)\, b^0$$

$$\ln(a) - \ln(b) \cdot 1$$

$$\ln(a) - \ln(b)$$

$$\log_b(x) - \log_b(y) = \log_b\left(\frac{x}{y}\right)$$

$\ln\left(\frac{a}{b}\right)$ // Respuesta.

2DO EJERCICIO

$$\lim_{\theta\to 0} \frac{\theta - \operatorname{arc\,sen}\theta}{\operatorname{sen}^3\theta} = \lim_{\theta\to 0} \frac{\frac{d}{d\theta}(\theta - \operatorname{arc\,sen}(\theta))}{\frac{d}{d\theta}(\operatorname{sen}^3(\theta))} = \lim_{\theta\to 0} \frac{1-\frac{d}{d\theta}(\operatorname{arc\,sen}(\theta))}{3y^2\cdot\frac{d}{d\theta}(\operatorname{sen}(\theta))}$$

$$\lim_{\theta\to 0} \frac{1-\frac{1}{\sqrt{1-\theta^2}}}{3\operatorname{sen}(\theta)^2\cos(\theta)} = \lim_{\theta\to 0} \frac{\frac{1}{1}-\frac{1}{\sqrt{1-\theta^2}}}{3\operatorname{sen}(\theta)^2\cos(\theta)} = \lim_{\theta\to 0} \frac{\frac{\sqrt{1-\theta^2}\cdot 1}{\sqrt{1-\theta^2}\cdot 1} - \frac{1}{\sqrt{1-\theta^2}}}{3\operatorname{sen}(\theta)^2\cos(\theta)}$$

$$\lim_{\theta\to 0} \frac{\frac{\sqrt{1-\theta^2}-1}{\sqrt{1-\theta^2}}}{3\operatorname{sen}(\theta)^2\cos(\theta)} = \lim_{\theta\to 0} \frac{\sqrt{1-\theta^2}-1}{\sqrt{1-\theta^2}}\cdot\frac{1}{3\operatorname{sen}(\theta)^2\cos(\theta)} = \lim_{\theta\to 0} \frac{(\sqrt{1-\theta^2}-1)\cdot 1}{\sqrt{1-\theta^2}\cdot 3\operatorname{sen}(\theta)^2\cos(\theta)} =$$

$$\lim_{\theta\to 0} \frac{\sqrt{1-\theta^2}-1}{3\sqrt{1-\theta^2}\operatorname{sen}(\theta)^2\cos(\theta)} = \lim_{\theta\to 0} \frac{\frac{d}{d\theta}(\sqrt{1-\theta^2}-1)}{\frac{d}{d\theta}(3\sqrt{1-\theta^2}\operatorname{sen}(\theta)^2\cos(\theta))} = \left(\lim_{\theta\to 0} \frac{\frac{1}{2\sqrt{1-\theta^2}}\cdot(-2\theta)-0}{-3\theta\cdot\operatorname{sen}(\theta)^2\cos(\theta)^2}\right)$$

$$\lim_{\theta\to 0} \frac{\frac{1}{2\sqrt{1-\theta^2}}\cdot(-2\theta)-0}{\frac{-3\theta\cdot\operatorname{sen}(\theta)^2\cos(\theta)+3(1-\theta^2)\cdot\operatorname{sen}(2\theta)\cos(\theta)-3(1-\theta)^2\cdot\operatorname{sen}(\theta)^3}{\sqrt{1-\theta^2}}} =$$

$$\lim_{\theta\to 0} \frac{-\frac{\theta}{\cancel{\sqrt{1-\theta^2}}}}{\frac{-3\theta\cdot\operatorname{sen}(\theta)^2\cos(\theta)+3(1-\theta)^2\cdot\operatorname{sen}(2\theta)\cos(\theta)-3(1-\theta)^2\cdot\operatorname{sen}(\theta)^3}{\cancel{\sqrt{1-\theta^2}}}}$$

$$\lim_{\theta \to 0} - \frac{\theta}{-3\theta \cdot sen(\theta)^2 \cos(\theta) + 3(1-\theta)^2 \cdot sen(2\theta)\cos(\theta) - 3(1-\theta)^2 \cdot sen(\theta)^3}$$

$$-\lim_{\theta \to 0} \frac{\frac{d}{d\theta}(\theta)}{\frac{d}{d\theta}(-3\theta \cdot sen(\theta)^2 \cos(\theta) + 3(1-\theta)^2 \cdot sen(2\theta)\cos(\theta) - 3(1-\theta)^2 \cdot sen(\theta)^3}$$

$$-\lim_{\theta \to 0} \frac{1}{-3 \cdot 0^2 \cdot 1 - 0 + 0 + 6 \cdot 1\cos(0) \cdot 1 - 3 \cdot 1 sen(0) \cdot 0 - 9 \cdot 0^2 \cdot 1 \cdot 1}$$

$$- \frac{1}{-3 \cdot 0 \cdot 1 + 6 \cdot 1 - 3 \cdot 0 \cdot 0 - 9 \cdot 0}$$

$$- \frac{1}{0 + 6 - 0 - 9 \cdot 0}$$

$$- \frac{1}{0 + 6 - 0 - 0}$$

$$- \frac{1}{6 - 0 + 0}$$

$$- \frac{1}{6}$$

3ER EJERCICIO

$$\lim_{x \to \emptyset} \frac{\operatorname{sen} x - \operatorname{sen} \emptyset}{x - \emptyset} = \frac{\operatorname{sen} 0 - \operatorname{sen} \emptyset}{\emptyset - 0} = \frac{0}{0}$$

$$\lim_{y = 0} = \frac{\operatorname{sen}(y+a) - \operatorname{sen} 0}{y} = \lim_{y \to 0}$$

$$\lim_{y = 0} = \frac{\operatorname{sen} y \cos \emptyset + \operatorname{sen} \emptyset \cos y - \operatorname{sen} \emptyset}{y}$$

$$\lim_{y \to 0} \frac{\operatorname{sen} y \cos 0 + \operatorname{sen} \emptyset (\cos y - 1)}{y}$$

$$\lim_{y = 0} \frac{\operatorname{sen} y \cos \emptyset}{y} + \lim_{y \to 0} \frac{\operatorname{sen} \emptyset (\cos y - 1)}{y}$$

$$\cos \emptyset \cdot \lim_{y \to 0} \frac{\operatorname{sen} y}{y} + \operatorname{sen} \emptyset \cdot \lim_{y \to 0} \frac{\cos y - 1}{y} = \cos \emptyset.$$

$$\lim_{x \to \emptyset} \frac{\operatorname{sen} x - \operatorname{sen} \emptyset}{x - \emptyset} = \cos \emptyset$$

Respuesta $\cos \emptyset$

4TO EJERCICIO

$$\lim_{y \to 0} \frac{e^y + sen\, y - 1}{In\,(1+y)} =$$

$$\lim_{y \to 0} \frac{\frac{d}{dy}\left(e^y + sen(y) - 1\right)}{\frac{d}{dy}\left(In\,(1+y)\right)} = \lim_{y \to 0} \frac{e^y + \cos(y) - 0}{\frac{1}{y} \cdot (1+y)} =$$

$$\lim_{y \to 0} \frac{e^y + \cos(y)}{\frac{1}{1+y} \cdot 1} = \lim_{y \to 0} \left(e^y + \cos(y)\right) \div \frac{1}{1+y} = \lim_{y \to 0} \left(e^y + \cos(y)\right) \cdot (1+y) =$$

$$\lim_{y \to 0} \left(e^y + ye^y + \cos(y) + \cos(y) \cdot y\right) = e^0 + 0e^0 + \cos(0) + \cos(0) \cdot 0 = 1 + 0 \cdot 1 + 1 + 0 = 2$$

Respuesta 2

5TO EJERCICIO

$$\lim_{x \to 0} \frac{e^{x} - e^{-z}}{\operatorname{sen} x}.$$

$$\lim_{x \to 0} \frac{\frac{d}{dx}\, e^{x} - e^{-x}}{\frac{d}{dx}\, \operatorname{sen} x} = \lim_{x \to 0} \frac{\frac{e^{2x}+1}{e^{x}}}{\frac{d}{d}\,(\sin(x))} =$$

$$\lim_{x \to 0} \frac{\frac{e^{2x}+1}{ex}}{\cos(x)} = \lim_{x \to 0} \frac{e^{2x}+1}{e^{x}} \div \cos(x) = \lim_{x \to 0} \frac{e^{2x}+1}{e^{x}} \cdot \frac{1}{\cos(x)}$$

$$\lim_{x \to 0} \frac{(e^{2x}+1) \cdot 1}{e^{x} \cdot \cos(x)} = \frac{e^{2 \cdot 0}+1}{e^{0} \cdot \cos(0)} = \frac{e^{0}+1}{1\, \cos(0)} = \frac{e^{0}+1}{1 \cdot 1} = \frac{1+1}{1} = \frac{2}{1} = 2$$

Respuesta 2

6TO EJERCICIO

$$\lim_{x\to 0} \frac{tg\,x - x}{x - sen\,x} =$$

$$\lim_{x\to 0} = \frac{\frac{d}{dx}(\tan(x) - x)}{\frac{d}{dx}(x - \sin(x))} = \lim_{x\to 0} \frac{\frac{d}{dx}(\tan(x)) - \frac{d}{dx}(x)}{\frac{d}{dx}(x) - \frac{d}{dx}(\sin(x))} =$$

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

$$\lim_{x\to 0} \frac{\sin(x)^2}{\cos(x)} \div 1 - \cos(x) = \lim_{x\to 0} \frac{\sin(x)^2}{\cos(x)^2} \cdot \frac{1}{1 - \cos(x)} =$$

$$\lim_{x\to 0} \frac{\sin(x)^2}{\cos(x)^2 \cdot (1 - \cos(x))} = \lim_{x\to 0} \frac{1 - \cos(x)^2}{\cos(x)^2 \cdot (1 - \cos(x))} =$$

$$\lim_{x\to 0} \frac{\cancel{(1 - \cos(x))} \cdot (1 + \cos(x))}{\cos(x)^2 \cdot \cancel{(1 - \cos(x))}} = \lim_{x\to 0} \frac{1 + \cos(x)}{\cos(x)^2} =$$

$$\frac{1 + \cos(0)}{\cos(0)^2} = \frac{1 + 1}{1^2} = \frac{2}{1^2} = 2$$

Respuesta 2

7MO EJERCICIO

$$\lim_{z \to \frac{\pi}{2}} \frac{\ln \operatorname{sen} x}{(\pi - 2x)^2}$$

$$\lim_{x \to \frac{\pi}{2}} \frac{\frac{d}{dx}\left(\ln(\sin(x))\right)}{\frac{d}{dx}\left(\pi(-2x)^2\right)} = \lim_{x \to \frac{\pi}{2}} \frac{\frac{d}{dg}\left(\ln(g)\right) \times \frac{d}{d} \times (\sin(x))}{\frac{d}{dx}\left((\pi-2x)^2\right)}$$

$$\lim_{x \to \frac{\pi}{2}} \frac{\frac{1}{g} \times \cos(x)}{\frac{d}{dx}\left((\pi-2x)^2\right)} = \lim_{x \to \frac{\pi}{2}} \frac{\frac{1}{\sin(x)}\cos(x)}{\frac{d}{dx}\left((\pi-2x)^2\right)} = \lim_{x \to \frac{\pi}{2}} \frac{\cot(x)}{\frac{d}{dx}\left((\pi-2x)^2\right)}$$

$$\lim_{x \to \frac{\pi}{2}} \frac{\frac{dx}{dx}\cot(x)}{\frac{d}{dx} -4\pi+8x} = \lim_{x \to \frac{\pi}{2}} -\frac{\csc(x)^2}{8} = \lim_{x \to \frac{\pi}{2}} -\frac{\left(\frac{1}{\sin(x)}\right)^2}{8} =$$

$$\lim_{x \to \frac{\pi}{2}} \frac{-1}{\sin(x)^2} \div 8 = \lim_{x \to \frac{\pi}{2}} -\frac{1}{8\sin(x)^2} = -\frac{1}{8\sin\left(\frac{\pi}{2}\right)^2} =$$

$$-\frac{1}{8(x)^2} = -\frac{1}{8}$$

Respuesta $-\frac{1}{8}$