Universidad Mariano Gálvez de Guatemala

Ingeniería en Sistemas de Información y Ciencias de la Computación

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Cálculo #1

Tema: Tarea del segundo parcial

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Semana 7

Tarea Semana # 7 — Regla de la Cadena.

1. $f(x) = (x^4 + 3x^2 - 2)^5$

$f'(x) = 5(x^4+3x^2-2)^4 \cdot (x^4 + 3x^2 - 2) \frac{dx}{dy}$

$dx/dy = (4x^3 + 6x)$

$f'(x) = 5(x^4+3x^2-2)^4 \cdot (4x^3 + 6x)$ //R

2. $f(x) = \sqrt{1-2x}$

$F(x) = (1-2x)^{1/2}$

$F(x) = \frac{1}{2}(1-2x)^{-1/2} \cdot (1-2x) \frac{dx}{dy}$

$dx/dy = (-2)$

$f'(x) = \frac{1}{2}(1-2x)^{-1/2} \cdot (-2) = \frac{-2}{2}(1-2x)^{-1/2}$

$f'(x) = -(1-2x)^{-1/2} = \frac{1}{\sqrt{1-2x}}$ //R

3. $f(z) = \frac{1}{z^2+1}$

$f(z) = 1(z^2+1)^{-2}$

$f(z) = -1(z^2+1)^{-2} \cdot (z^2+1) \frac{dx}{dy}$

$dx/dy = 2z$

$f'(z) = \frac{-2z}{(z^2+1)^2}$ //R

4. $h(t) = t^3 - 3^t$

$h(t) = (t^3 - 3^t)\frac{dx}{dy}$

$dx/dt = (3t^2 - 3^t)$

$h'(t) = 3t^2 - 3^t$ //R//

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5. $f(t) = \sqrt[3]{1 + \tan t}$

$f(t) = (1 + \tan t)^{3/2}$

$f(t) = \frac{3}{2}(1 + \tan t) \cdot (1 + \tan t)\frac{dx}{dy}$

$dx/dy = (\sec^2 t)$

$f(t) = \frac{3}{2}(1 + \tan t)^{2/2}(\sec^2 t)$

$f'(t) = \frac{3\sec^2 t}{2(1 + \tan t)^{2/2}}$ //R//

6. $f(x) = (4x - x^2)^{100}$

$f(x) = 100(4x - x^2)^{99} \cdot (4x - x^2)\frac{dx}{dy}$

$dx/dy = (4 - 2x)$

$f'(x) = 100(4x - x^2)^{99} \cdot (4 - 2x)$ //R//

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Semana 8

Tarea Semana #8 – Encuentre dy/dx por derivación Implícita.

1. $x^3 + y^3 = 1$

$$x^3 \frac{dy}{dx} + y^3 \frac{dy}{dx} = 1 \frac{dy}{dx}$$

$$3x^2 + 3y^2 \cdot y' = 0$$

$$(3x^2 + 3y^2) y' = 0$$

$$y' = \frac{-3x^2}{-3y^2} = \frac{-x^2}{y^2}$$

2. $2\sqrt{x} + \sqrt{y} = 3$

$$2(x)^{1/2} \frac{dy}{dx} + (y)^{1/2} \frac{dx}{dx} = 3 \frac{dy}{dx}$$

$$2x^{1/2} + y^{1/2} \cdot y' = 0$$

$$2 \cdot \frac{1}{2} x^{-1/2} + \frac{1}{2} y^{-1/2}$$

$$\frac{\cancel{2} x^{-1/2}}{\cancel{2}} + \frac{y^{-1/2}}{2} \cdot y'$$

$$x^{-1/2} + \frac{1}{2\sqrt{y}} y'$$

$$\frac{1}{2\sqrt{x}} + \frac{1}{2\sqrt{y}} y' = 0$$

$$\frac{1}{2\sqrt{y}} y' = \frac{-1}{2\sqrt{x}} = y' = \frac{2\sqrt{y}}{\sqrt{x}}$$

3. $x^2 + xy - y^2 = 4$

$$x^2\frac{dy}{dx} + xy\frac{dy}{dx} - y^2\frac{dy}{dx} = 4\frac{dy}{dx}$$

$$\frac{dy}{dx} = (1)(y) + (x)(y)(y')$$

$$y + xy' \cdot y$$

$$2x + xy' + y - 2y \cdot y' = 0$$

$$-xy' - 2yy' = -2x - y$$

$$y'(x - 2y) = -2x - y$$

R// $$y' = \frac{-2x - y}{x - 2y}$$

4. $2x^3 + x^2y - xy^3 = 2$

$$2x^3\frac{dy}{dx} + x^2y\frac{dy}{dx} - xy^3\frac{dy}{dx} = 2\frac{dy}{dx}$$

$$x^2y\frac{dy}{dx} = (2x)(y) + (x^2)(1)(y')$$

$$2xy + x^2y'$$

$$xy^3\frac{dy}{dx} = (1)(y^3) + (x)(3y^2)(y')$$

$$y^3 + 3xy^2 \cdot y'$$

$$6x^2 + 2xy + x^2y' - y^3 + 3xy^2y'$$

$$-x^2y' - 3xy^2y' = -6x^2 - 2xy + y^3$$

$$y'(x^2 + 3xy^2) = -6x^2 - 2xy + y^3$$

R// $$y' = \frac{-6x^2 - 2xy + y^3}{x^2 - 3xy^2}$$

5. $x^4(x+y) = y^2(3x-y)$

$$x^4(x+y)\frac{dx}{dx} = y^2(3x-y)\frac{dx}{dx}$$

$$(4x^3)(x+y)+(x^4)(1+y') = (2y)(3x-y)+(y^2)(3-y')$$

$$4x^3(x+y) + x^4(1+y') = 2y\cdot y'(3x-y) + y^2(3-y')$$

$$4x^4+4x^3y+x^4+x^4y' = 6xyy' - 2y^2y' + 3y^2 - y^2y'$$

$$x^4y' - 6xyy' + 2y^2y' + y^2y' = -4x^4 - 4x^3y - x^4 + 3y^2$$

$$y'(x^4-6xy+2y^2+y^2) = -4x^4-4x^3y-x^4+3y^2$$

$$y' = \frac{-4x^4-4x^3y-x^4+3y^2}{x^4-6xy+2y^2+y^2}$$

$$y' = \frac{-5x^4-4x^3y+3y^2}{x^4-6xy+3y^2} \quad //$$

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Semana 9

Tarea Semana #9 - Derivadas Logaritmicas

$f(x) = x \ln x - x$

$f(x) = x(\ln x)\frac{dx}{dy} - x\frac{dx}{dy}$

$x(\ln x)\frac{dx}{dy} = (1)(\ln x) + (x)(1/x)$

$\ln x + \cancel{x} \cdot \frac{1}{\cancel{x}} = \ln x + 1$

$f'(x) = \ln x + 1 - 1$

R// $f'(x) = \boxed{\ln x}$

$f(x) = \text{Sen}(\ln x)$

$f(x) = \text{Sen}(\ln x)\frac{dx}{dy} \cdot (\ln x)\frac{dx}{dy}$

$f(x) = \cos \ln x \cdot \frac{1}{x}$

R// $f'(x) = \frac{\cos(\ln x)}{x}$

$f(x) = \ln(\text{sen}^2 x)$

$f(x) = 2 \ln(\text{sen}\, x)$

$f'(x) = 2 \cdot \frac{1}{x}(\text{sen}\, x) \cdot (\text{sen}\, x)\frac{dx}{dy}$

$dx/dy = \cos x$

$f'(x) = 2 \cdot \frac{1}{(\text{sen}\, x)} \cdot (\cos x)$

R// $f'(x) = \frac{2 \cos x}{\text{sen}\, x}$

$f(x) = \log_2 (1-3x)$

$f'(x) = \dfrac{1}{(1-3x) \cdot \ln 2} (-3)$

$f'(x) = \dfrac{-3}{(1-3x) \cdot 0.69}$

R// $f'(x) = \cancel{\dfrac{-3}{0.69 - 2.7x}}$ R// $f'(x) = \dfrac{-3}{0.69 - 2.7x}$

$f(x) = \log_5 (x e^x)$

$f'(x) = \dfrac{1}{(x e^x) \ln 5} (\ln x)$

R// $f'(x) = \dfrac{\ln x}{(x e^x)\, 1.76}$

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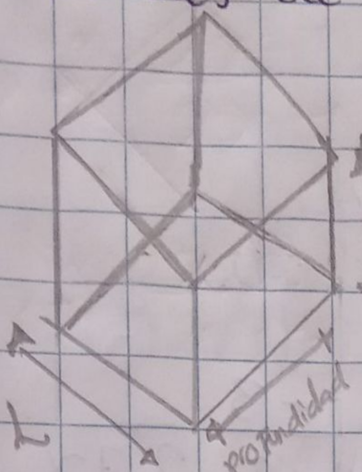
Semana 10

Tarea Semana #10 - Razones de cambio

1. Si V es el volumen de un cubo con longitud de arista x y el cubo se expande al transcurrir el tiempo, encuentre dv/dt en terminos de dx/dt.



$V = a^3$

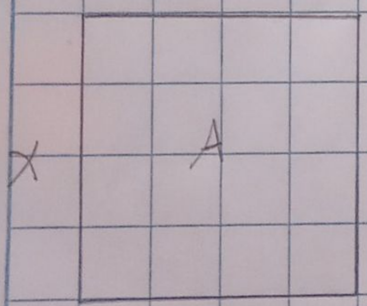
$V = 3a^2 \frac{dx}{dv}$

$\frac{dv}{dx} = 6a$

$V = a^3$

R// $\frac{dv}{dt} = 6a$

2. Cada lado de un cuadrado esta aumentando a razón de 6 cm/s. ¿Con que rapidez esta aumentando el area del cuadrado cuando esta es de 16 cm²?



$dx/dt = 6cm^2$

$dA/dt =$

$A = 16cm^2$

$A = x^2$

$A = 16$

$A = \sqrt{16}$

$A = 4$

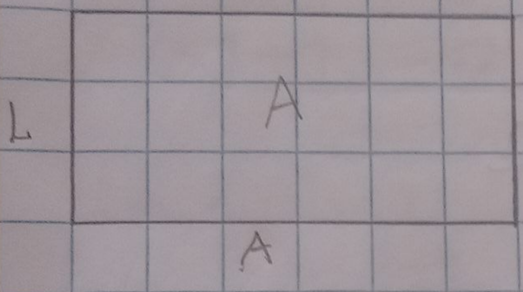
R// $48 cm^2/s$

$\frac{dA}{dt} = 2x \frac{dx}{dt}$

$\frac{dA}{dt} = 2(4)(6)$

$= 48 cm^2/s$

3.- La longitud de un rectangulo esta aumentando a razón de 8 cm/s y su ancho esta aumentando a razón de 3 cm/s. Cuando la longitud es de 20 cm y el ancho es de 10 cm ¿Con que rapidez esta aumentando el area del rectangulo?



$$\frac{dL}{dt} = 8\,cm/s \qquad L = 20\,cm$$

$$W = 10\,cm$$

$$\frac{dw}{dt} = 3\,cm/s$$

$$A = L \cdot W$$

$$\frac{dA}{dt} = \frac{dL}{dt} \cdot W + L \cdot \frac{dw}{dt}$$

$$\frac{dA}{dt} = (8\,cm/s)(10\,cm) + (20\,cm)(3\,cm/s)$$

$$80\,cm^2/s + 60\,cm^2/s$$

$$140\,cm^2/s$$

$$\frac{dA}{dt} = 140\,cm^2/s$$

R// $\frac{dA}{dt} = 140\,m^2/s$

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Semana 11

Tarea Semana # 11 - Regla de L'Hospital

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

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

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

R// 2

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

$\lim_{x \to 1} \frac{ax}{bx} = \frac{a(1)}{b(1)} = \frac{a}{b}$

R// $\frac{a}{b}$

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

$\cos\left(\frac{\pi}{2}\right) = 0 \quad \operatorname{sen}\left(\frac{\pi}{2}\right) = 1$

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

$\lim \frac{-\sin(x)}{\cos(x)} = \infty$ R// ∞

4. $\lim_{x \to 0} \frac{\operatorname{sen} 4x}{\tan 5x} = \frac{\operatorname{sen} 4(0)}{\tan 5(0)} = \frac{0}{0}$

$\lim_{x \to 0} \frac{\frac{dx}{dy}(\operatorname{sen} 4x)}{\frac{dx}{dy}(\tan 5x)} = \frac{4 \cos(4x)}{5 \sec^2(5x)} =$

$\lim_{x \to 0} \frac{4 \cos(4x)}{5 \cdot \frac{1}{\cos^2(5x)}} = \frac{4 \cos(4x) \cdot \cos^2(5x)}{5}$

$\lim \frac{4(1) \cdot (1)^2}{5} = \frac{4}{5}$ R// $\frac{4}{5}$

5.- $\lim_{t \to 0} \frac{e^{3t} - 1}{t} =$

$\lim_{t \to 0} \frac{(e^{3t} - 1)\frac{dx}{dt}}{(t)\frac{dx}{dt}} = \frac{3e^{t}}{1} =$

$\lim_{t \to 0} \frac{3(1)}{1} = \frac{3}{1} = 3$

R// 3

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Semana 13

Tarea Semana #13 — Antiderivadas

1. $f(x) = 8x^9 - 3x^6 + 12x^3$

$f(x) = \frac{8x^{9+1}}{9+1} - \frac{3x^{6+1}}{6+1} + \frac{12x^{3+1}}{3+1}$

$f(x) = \frac{8x^{10}}{10} - \frac{3x^7}{7} + \frac{12x^4}{4} + C$

$F(x) = \frac{4x^{10}}{5} - \frac{3x^7}{7} + 3x^4 + C$

R// $\frac{4x^{10}}{5} - \frac{3x^7}{7} + 3x^4 + C$

2. $f(x) = (x+1)(2x-1)$

$f(x) = x(2x-1) + 1(2x-1)$

$2x^2 - x + 2x - 1$

$2x^2 + x - 1$

$(2x^2 + x - 1)\,dx$

$f(x) = 2x^2\,dx + x\,dx - 1\,dx$

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

$f'(x) = \frac{2x^3}{3} + \frac{x^2}{2} - x + C$

R// $F'(x) = \frac{2x^3}{3} + \frac{x^2}{2} - x + C$

3. $f''(x) = 6x + 12x^2$

$f'(x) = \frac{6x^{1+1}}{1+1} + \frac{12x^{2+1}}{2+1}$

$F''(x) = \frac{6x^2}{2} + \frac{12x^3}{3}$

$f''(x) = 3x^2 + 4x^3$

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

$F'(x) = \frac{3x^3}{3} + \frac{4x^4}{4} = F'(x) = x^3 + x^4 + cx + D$

R// $F'(x) = x^3 + x^4 + cx + D$

4. $f'(x) = 8x^3 + 12x + 3, \quad f(1) = 6$

$f'(x) = \frac{8x^{3+1}}{3+1} + \frac{12x^{1+1}}{1+1} + 3x + C$

$f'(x) = \frac{8x^4}{4} + \frac{12x^2}{2} + 3x + C$

$f'(x) = 2x^4 + 6x^2 + 3x + C$

R. // $f'(x) = 2x^4 + 6x^2 + 3x + C$

5. $F''(x) = 2 + x^3 + x^5$

$F''(x) = 2x + \frac{x^{3+1}}{3+1} + \frac{x^{5+1}}{5+1}$

$F''(x) = 2x + \frac{x^4}{4} + \frac{x^7}{7} + c$

$F'(x) = \frac{2x^{1+1}}{1+1} + \frac{x^{4+1}}{4+1} + \frac{x^{7+1}}{7+1} + cx + D$

$F'(x) = \frac{2x^2}{2} + \frac{x^5}{5} + \frac{x^8}{8} + cx + D$

$F'(x) = x^2 + \frac{x^5}{5} + \frac{x^8}{8} + cx + D$

R// $F'(x) = x^2 + \frac{x^5}{5} + \frac{x^8}{8} + cx + D$