EMI — ESCUELA MILITAR DE INGENIERIA "Mcal. Antonio José de Sucre" Prestigio, Disciplina y Mejores Oportunidades	**EXAMEN 2 PARCIAL** **SOLUCIONARIO DEL EXAMEN (MOSOL)**	
CARRERA: CIENCIAS BASICAS	**ASIGNATURA:** Calculo I	**FECHA:** 10/05/2021
CURSO: Primer Semestre	**DOCENTE:** Ing. Rosalva Alcocer V.	
UNIDADES TEMÁTICAS A EVALUAR	5. Derivadas 6 aplicación de las derivadas	

Reemplaza N por el valor asignado

$N = 5$

1. Halla la derivada por definición

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

solución:

$$f(x) = \frac{x^2 - x}{2x + 5}$$

$$\lim_{h\to 0} \frac{f(x+h) - f(x)}{h} =$$

$$\lim_{h\to 0} \frac{\frac{(x+h)^2 - (x+h)}{2(x+h)+5} - \frac{x^2 - x}{2x+5}}{h}$$

$$\lim_{h\to 0} \frac{\frac{5h^2 + 10xh + 2h^2x + 2x^2h - 5h}{(2x+5)(2h+2x+5)}}{h} = \lim_{h\to 0} \frac{5h + 10x + 2hx + 2x^2 - 5}{(2x+5)(2h+2x+5)} = \frac{10x + 2x^2 - 5}{(2x+5)^2}$$

2. Si $f(x) =$ hallar la derivada $f'(x)$ con b constante

$$f(x) = \sqrt[7]{\sin[\ln^5(4x^2 - b)]} = (\sin[\ln^5(4x^2 - b)])^{\frac{1}{7}}$$

$$f'(x) = \tfrac{1}{7}(\sin[\ln^5(4x^2 - b)])^{-\frac{6}{7}} \cos[\ln^5(4x^2 - b)] 5\ln^4(4x^2 - b)\frac{1}{4x^2 - b} 8x$$

$$f'(x) = \frac{40x}{7} \frac{(\sin[\ln^5(4x^2 - b)])^{-\frac{6}{7}} \cos[\ln^5(4x^2 - b)] \ln^4(4x^2 - b)}{4x^2 - b}$$

3. Derivar

a. $xy - \cos(y^N) = \tan(x^N)$

$$y + y' - \sin(y^5)5y^4y' = \sec^2(x^5)(5x^4),$$

$$y' = \frac{5x^4 \sec^2(x^5) - y}{1 - 5y^4 \sin y^5}$$

b. $y = [\sec(5x - c)]^{\cos(x^5)}$

$$\ln y = \cos(x^5) \ln[\sec(5x - c)]$$

$$\tfrac{1}{y}y' = -\sin(x^5)5x^4\ln[\sec(5x-c)] - \cos(x^5)\frac{1}{\sec(5x-c)}\sec(5x-c)\tan(5x-c)5$$

$$y' = [\sec(5x-c)]^{\cos(x^5)}\left\{-5x^4\sin(x^5)\ln[\sec(5x-c)] - \frac{5\cos(x^5)\sec(5x-c)\tan(5x-c)}{\sec(5x-c)}\right\}$$

4. Hallar ángulo de intersección entre las curvas

$$f(x) = x - N$$

$$x = Ny^2$$

$$\begin{cases} y = x - 5 \\ x = 5y^2 \end{cases}$$

$$y = 5y^2 - 5 \rightarrow 5y^2 - y - 5 = 0,$$

$$y_1 = \tfrac{1}{10}\sqrt{101} + \tfrac{1}{10} \equiv 1.1050 \qquad y_2 = \tfrac{1}{10} - \tfrac{1}{10}\sqrt{101} = -0.90499 :$$

$$x_1 = \tfrac{1}{10}\sqrt{101} + \tfrac{51}{10} = 6.1050 \qquad x_2 = \tfrac{51}{10} - \tfrac{1}{10}\sqrt{101} = 4.095$$

Para $P_1(6.1, 1.1)$

$$y_1' = 1 \qquad 1 = 10yy' \rightarrow y_2' = \frac{1}{10y}$$

$$y_1' = 1 \qquad y_2' = \frac{1}{10(1.1)} = 9.0909 \times 10^{-2}$$

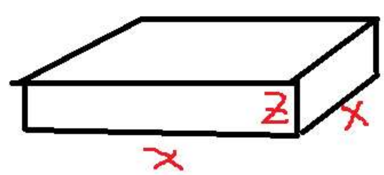
$$\tan\theta = \frac{1 - 9.0909\times10^{-2}}{1 + 9.0909\times10^{-2}} = 0.83333 \rightarrow \theta = 39.79°$$

Para $P_2(4.1, -0.9)$

$$y_1' = 1 \qquad y_2' = \frac{1}{10(-0.9)} = -0.11$$

$$\tan\theta = \frac{1+0.11}{1-0.11} = 1.2472 \rightarrow \theta = 50.89°$$

5. Determinar las dimensiones de un sólido rectangular (con base cuadrada) sin tapa, de volumen máximo si su área rectangular es de Ncm^2.



$$V = x^2z$$

$$S = 4xz + x^2 = N \rightarrow z = \frac{N - x^2}{4x}$$

$$V = x^2\left(\frac{N-x^2}{4x}\right)$$

$$V = \frac{Nx}{4} - \frac{x^3}{4} \qquad V' = \frac{N}{4} - \frac{4}{3}x^2 \qquad \frac{N}{4} - \frac{4}{3}x^2 = 0,$$

$$x = \frac{\sqrt{3N}}{4}$$