UNIVERSIDAD DE CONCEPCION
**FACULTAD DE CIENCIAS FISICAS Y MATEMATICAS**
DEPARTAMENTO DE MATEMATICA

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# Respuestas Listado 9: Calculo I (527140)

1.- (a) Si es derivable y $f'(x_0) = \dfrac{1}{8\sqrt[8]{128}}$

(b) Si es derivable y $f'(x_0) = \cos(1)$

(c) No es derivable en $x_0$

(d) Si es derivable y $f'(x_0) = 2\pi + 2$

2.- (a) Recta Tangente : $y = 3 + \sin(1) + (6 + \cos(1))(x-1)$ y recta normal: $y = 3 + \sin(1) - \dfrac{x-1}{6+\cos(1)}$

(b) Recta Tangente : $y = \dfrac{\sqrt{2}}{2} + 1 + \left(\dfrac{\sqrt{2}}{2} - 2\right)\left(x - \dfrac{\pi}{4}\right)$ y recta normal: $y = \dfrac{\sqrt{2}}{2} + 1 - \dfrac{2}{\sqrt{2}-4}\left(x - \dfrac{\pi}{4}\right)$

(c) Recta Tangente : $y = -\dfrac{4}{\pi^2} + \left(\dfrac{16}{\pi^3} - 1\right)\left(x - \dfrac{\pi}{2}\right)$ y recta normal: $y = -\dfrac{4}{\pi^2} + \left(\dfrac{\pi^3}{16 - \pi^3}\right)\left(x - \dfrac{\pi}{2}\right)$

(d) Recta Tangente : $y = 4 + 2(x-1)$ y recta normal: $y = 4 - \dfrac{1}{2}(x-1)$

3.- (a) $f'(x) = \cos^2(x)\sin^2(x)$

(b) $f'(x) = \dfrac{\mathrm{tg}(x) + 3x\sec^2(x)}{3x^{2/3}}$

(c) $f'(x) = \dfrac{(6x+1)(x+6\cos(x)) - (3x^2+x)(1-6\sin(x))}{(x+6\cos(x))^2}$

(d) $f'(x) = \dfrac{3}{2}\sqrt{x}(5x+1)$

(e) $f'(x) = \dfrac{[(2x+3x^2)(1+\cos(x)) - (x^2+x^3)\sin(x)]\sin(x) - (x^2+x^3)(1+\cos(x))\cos(x)}{\sin^2(x)}$

(f) $f'(x) = \dfrac{(4 + \frac{21}{8}x^{-15/8})(\tan(x) - \sin(x)) - (4x - 3x^{-7/8})(\sec^2(x) + \cos(x))}{(\tan(x) - \sin(x))^2}$

4.- (a) $f'(x) = 6x + \dfrac{x}{\sqrt{x^2-1}}$

(b) $f'(x) = -\cos\left(\dfrac{1}{x-1}\right)\dfrac{1}{(x-1)^2}$

(c) $f'(x) = 3(x+1)^2\cos\left(\dfrac{x+1}{\sec(x)}\right) - (x+1)^3\sin\left(\dfrac{x+1}{\sec(x)}\right)(\cos(x) - (x+1)\sin(x))$

(d) $f'(x) = \dfrac{1}{3}\left(3x^2 - \dfrac{1}{x^2}\right)\left(x^3 + \dfrac{1}{x}\right)^{-2/3}$

(e) $f'(x) = 3\sin^2\left(\dfrac{3x}{x^2+1}\right)\cos\left(\dfrac{3x}{x^2+1}\right)\left(\dfrac{3(1-x^2)}{(x^2+1)^2}\right)$

(f) $f'(x) = \dfrac{1}{4}\left(x^3 + 2x - \cot\left(\dfrac{x\pi}{2}\right)\right)^{-3/4}\left(3x^2 + 2 + \dfrac{\pi}{2}\csc\left(\dfrac{x\pi}{2}\right)\right)$

5.- El punto de intersección es $\left(-\dfrac{4}{5}, \dfrac{22}{5}\right)$

6.- (a) $f''(x) = -\dfrac{2(x^2+3)}{9(x^2-1)^{5/3}}$

(b) $f''(x) = \dfrac{(6x^4 - 12x^7 + 6x)\sin\left(\dfrac{1}{x^3-1}\right) - 9x^4\cos\left(\dfrac{1}{x^3-1}\right)}{(x^3-1)^4}$

(c) $f''(x) = \dfrac{-4\sqrt{x}-3}{18(\sqrt{x}+1)^{4/3}x^{3/2}}$

7.- Una partícula se mueve por un medio acuoso siguiendo la trayectoria $r(t) = 3t^3 + t^{1/2}$ Donde $t$ está en segundos, calcular:

(a) $r(0) = 0$

(b) La velocidad media,$V_m = 4$

(c) $v(t) = r'(t) = 9t^2 + \dfrac{1}{2\sqrt{t}}$

(d) $v(1) = \dfrac{11}{2}$

(e) $a(5) = 18t - \dfrac{1}{4}x^{-3/2} = 90 - \dfrac{1}{4}5^{-3/2}$