

UNIVERSIDAD DE CONCEPCIÓN
FACULTAD DE INGENIERÍA AGRÍCOLA
DEPTO. DE AGROINDUSTRIAS

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PAUTA TEST N° 5 CÁLCULO I
INGENIERÍA AGROINDUSTRIAL – INGENIERÍA
AMBIENTAL – INGENIERÍA CIVIL AGRÍCOLA

NOMBRE : _____ **CARRERA :** _____
TIEMPO MÁXIMO : 20 MINUTOS **FECHA : Ma 08/05/18**

Obtenga $\left. \frac{dy}{dt} \right|_{t=1}$ si $y(t) = \frac{e^{1+\sin(t^3)}}{(t-5)^4} + \ln(1+5t) - \tan\left(\frac{1}{t}\right)$

(60 puntos)

Solución:

Sean $A = e^{1+\sin(t^3)}$, $B = (t-5)^4$, $C = \frac{A}{B}$, $D = \ln(1+5t)$, $E = \tan\left(\frac{1}{t}\right)$

Tenemos que:

$$\frac{dA}{dt} = e^{1+\sin(t^3)} (1 + \sin(t^3))' = e^{1+\sin(t^3)} (0 + \cos(t^3)) (t^3)' = 3t^2 \cos(t^3) e^{1+\sin(t^3)}$$

$$\frac{dB}{dt} = 4(t-5)^3 (t-5)' = 4(t-5)^3 ((t)' - 0) = 4(t-5)^3$$

$$\frac{dC}{dt} = \left(\frac{A}{B}\right)' = \frac{A' B - A B'}{B^2} = \frac{(3t^2 \cos(t^3) e^{1+\sin(t^3)}) (t-5)^4 - e^{1+\sin(t^3)} (4(t-5)^3)}{((t-5)^4)^2} =$$

$$\frac{(t-5)^3 [(3t^2 \cos(t^3) e^{1+\sin(t^3)}) (t-5) - 4e^{1+\sin(t^3)}]}{(t-5)^8} =$$

$$\frac{(3t^2 \cos(t^3) e^{1+\sin(t^3)}) (t-5) - 4e^{1+\sin(t^3)}}{(t-5)^5}$$

$$\frac{dD}{dt} = \frac{1}{1+5t} (1+5t)' = \frac{1}{1+5t} (0+5) = \frac{5}{1+5t}$$

$$\frac{dE}{dt} = \sec^2\left(\frac{1}{t}\right) \cdot \left(\frac{1}{t}\right)' = \sec^2\left(\frac{1}{t}\right) \cdot (t^{-1})' = \sec^2\left(\frac{1}{t}\right) (-1 \cdot t^{-2}) = -\frac{1}{t^2} \sec^2\left(\frac{1}{t}\right)$$

Evaluemos cada una de las expresiones anteriores en $t = 1$:

$$\left. \frac{dA}{dt} \right|_{t=1} = 3 \cos(1) e^{1+\sin(1)}$$

$$\left. \frac{dB}{dt} \right|_{t=1} = 4(-4)^3 = -4^4 = -256$$

$$\begin{aligned} \left. \frac{dC}{dt} \right|_{t=1} &= \frac{3 \cos(1) e^{1+\sin(1)} (-4) - 4e^{1+\sin(1)}}{(-4)^5} = \frac{4(-3 \cos(1) e^{1+\sin(1)} - e^{1+\sin(1)})}{-(-4)^5} \\ &= \frac{-3 \cos(1) e^{1+\sin(1)} - e^{1+\sin(1)}}{-(-4)^4} = \frac{3 \cos(1) e^{1+\sin(1)} + e^{1+\sin(1)}}{256} \end{aligned}$$

$$\left. \frac{dD}{dt} \right|_{t=1} = \frac{5}{1+5} = \frac{5}{6}$$

$$\left. \frac{dE}{dt} \right|_{t=1} = -\sec^2(1)$$

Finalmente, $\left. \frac{dy}{dt} \right|_{t=1} = \frac{3 \cos(1) e^{1+\sin(1)} + e^{1+\sin(1)}}{256} + \frac{5}{6} + \sec^2(1) \quad \square$