DEPARTAMENTO DE MATEMÁTICAS Y FÍSICA

Materia: **CALCULO INTEGRAL**

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Mini examen 1 Parcial 2

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Carrera: ICI 2-A

① $\int_0^{0.04} \cosh^2((10)x + (5)) \, dx$

$u = 10x + 5$

$du = 10 \, dx$

$dx = \frac{1}{10}$

$= \frac{1}{10} \int \cosh^2(u)$

$= \frac{1}{10} \left[\frac{\cosh(u)(\sin(u))}{2} + \frac{1}{2} \int 1 \, du \right]$

$= \frac{\cosh(u)\sinh(u)}{2} + \frac{u}{2} = \frac{1}{10}\left[\frac{\cosh(u)\sinh(u)}{2} + \frac{u}{2} \right]$

$= \frac{\cosh(u)\sin(u)}{20} + \frac{u}{20} = \frac{\cosh(10x+5)\sin(10x+5)}{20} + \frac{10x+5}{20}$

$= \frac{\sinh(20x+10) + 20x}{40} + c$ | Integral indefinida

Aplicando limite superior - inferior

$= \frac{\sinh(20(0.04) + (0)) + 20(0.04)}{40}$

$- \left[\frac{\sinh(20(0) + 10) + 20(0)}{40} \right]$

$= \frac{\sinh(10.8) + (0.8)}{40} - \frac{\sinh(10)}{40}$

$= 612.780014 - 275.3308219 = \underline{337.4491921}$ ≈

②

a) $\lim\limits_{x\to\infty} \left(\dfrac{8x^3 + 14x^2 + 9x + 3}{8x^3 + 11x^2 + 2x + 6} \right)$

$= \dfrac{dx\left(8x^3 + 14x^2 + 9x + 3\right)}{dx\left(8x^3 + 11x^2 + 2x + 6\right)} = \dfrac{24x^2 + 28x + 9}{24x^2 + 22x + 2dx} = \dfrac{48x + 28}{48x + 22} \dfrac{dx}{dx}$

$= \dfrac{48}{48} = \underline{1.}$

b) $\lim\limits_{x\to\infty} \left(1 - 8/x\right)^{14x} = \lim\limits_{x\to\infty} \dfrac{14 \ln\left(1 - 8/x\right)}{\frac{1}{x}}$

$y = \left(1 - 8/x\right)^{14x}$

$\ln y = 10x \ln\left(1 - 8/x\right)$

$\qquad = \lim\limits_{x\to\infty} \dfrac{14\left(\ln\left(1 - 8/x\right)\right)'}{(x^{-1})'}$

$= \dfrac{d}{dx} \ln\left(1 - 8/x\right) = \dfrac{1}{1 - 8/x} \cdot \left(-8x^{-2}\right)$

$= \dfrac{-8}{x^2} = \dfrac{-8}{x^2} = \dfrac{-8x}{x^3 - 8x^2} = \dfrac{8}{x^2 - 8x} \qquad \lim\limits_{x\to\infty} 14 \dfrac{8x^2}{x^2 - 8x} = -112$

$\dfrac{\frac{1}{1} - \frac{8}{x}}{\frac{x-8}{x}} \qquad -\dfrac{1}{x^2}$

$\lim\limits_{x\to\infty} \ln y = \ln\left(\lim\limits_{x\to\infty} y\right) = -112$

$\lim\limits_{x\to\infty} y = e^{-112} = \dfrac{1}{e^{112}}$