COLEGIO ALMA'S
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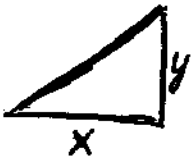
Corrección 3ª Evaluación - Matemáticas I - 1º Bach Ciencias
26-04-2018

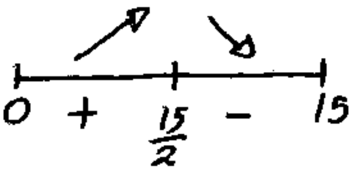
1.-



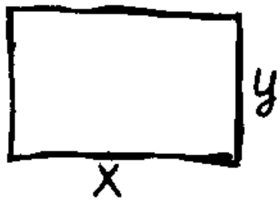
$x+y=15 \longrightarrow y=15-x$

Área $xy = x(15-x) = 15x-x^2 \longrightarrow \text{Dom} f(x)=\mathbb{R}$

$f'(x) = 15-2x = 0 \longrightarrow \boxed{x=\frac{15}{2}}$ max $\longrightarrow \boxed{y=\frac{15}{2}}$



2.-

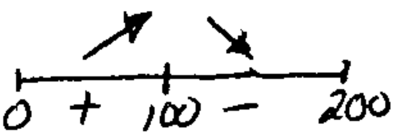


$2x+2y=400 \longrightarrow x+y=200 \longrightarrow y=200-x$

max Área $= xy = x(200-x) = 200x-x^2 = f(x)$

$\text{Dom} f(x) = \mathbb{R}$

$f'(x) = 200-2x = 0 \longrightarrow \boxed{x=100}$ max $\longrightarrow \boxed{y=100}$



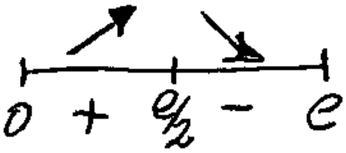
3.- $x+y=e \longrightarrow y=e-x$

función objetivo $\ln x + \ln y = \ln x + \ln(e-x) = f(x)$

$\text{Dom} f(x) = (0,e)$

$f'(x) = \frac{1}{x} - \frac{1}{e-x} = \frac{e-x-x}{x(e-x)} = \frac{e-2x}{x(e-x)} = 0 \longrightarrow e-2x=0$

$\boxed{x=e/2}$ Max $\longrightarrow \boxed{y=e/2}$



La suma da $\ln\frac{e}{2} + \ln\frac{e}{2} = 2\cdot\ln\left(\frac{e}{2}\right) = 2[\ln e - \ln 2] = \boxed{2-2\ln 2}$

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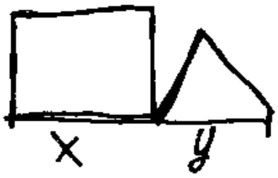

$x+y=6 \longrightarrow x=6-y$

$\text{Área} = x^2 + \frac{y^2\sqrt{3}}{4} = (6-y)^2 + \frac{y^2\sqrt{3}}{4} = f(y)$

$\text{Dom} f(y) = \mathbb{R}$

$f'(y) = -2(6-y) + \frac{y\sqrt{3}}{2} = 0 \longrightarrow 4(6-y) = y\sqrt{3}$

$24 - 4y = y\sqrt{3}$

$\boxed{y = \frac{24}{4+\sqrt{3}}}$ MIN

$0 \quad - \quad \frac{24}{4+\sqrt{3}} \quad + \quad 6$

Por lo tanto el max se obtendrá cuando:

$x = \frac{24+6\sqrt{3}-24}{4+\sqrt{3}} \longrightarrow \boxed{x = \frac{6\sqrt{3}}{4+\sqrt{3}}}$ MIN

$\left.\begin{matrix} x=0 \\ y=6 \end{matrix}\right\}$ Área $= 9\sqrt{3} \in (15,16)$

$\left.\begin{matrix} x=6 \\ y=0 \end{matrix}\right\}$ Área $= 36$

5.- a) $\int \left(\frac{\sqrt{x}}{x^2} - \frac{x^3}{x^2} + \frac{2x}{x^2}\right)dx = \int \left(x^{-3/2} - x + \frac{2}{x}\right)dx = \frac{x^{-1/2}}{-1/2} - \frac{x^2}{2} + 2\ln x + K$

$= \boxed{\frac{-2}{\sqrt{x}} - \frac{x^2}{2} + 2\ln x + K}$

b) $\int \left(x^2 - \frac{1}{x} + e^{-x}\right)dx = \boxed{\frac{x^3}{3} - \ln x - e^{-x} + K}$

c) $\int \frac{dx}{\sqrt{x}\cos^2\sqrt{x}} = \int \frac{2\sqrt{x}\,dt}{\sqrt{x}\cos t} = 2\int \frac{dt}{\cos^2 t} = 2\,\text{tg}\, t + K$

$= \boxed{2\,\text{tg}\sqrt{x} + K}$

$t = \sqrt{x}$

$dt = \frac{1}{2\sqrt{x}}dx \longrightarrow dx = 2\sqrt{x}\,dt$

d) $\int \frac{5}{1+(x-3)^2}\,dx = 5\int \frac{dt}{1+t^2} = 5\,\text{arctg}\, t + K = \boxed{5\,\text{arctg}(x-3)+K}$

$t = x-3$

$dt = dx$

e) $\int \frac{\text{arctg}\, x}{1+x^2}\,dx = \int \frac{t}{1+x^2}(1+x^2)\,dt = \int t\,dt = \frac{t^2}{2}+K = \boxed{\frac{\text{arctg}^2 x}{2}+K}$

$t = \text{arctg}\, x$

$dt = \frac{1}{1+x^2}\,dx \longrightarrow dx = (1+x^2)\,dt$

f) $\int (6x-3)\sqrt{2x^2-2x+3}\,dx = \int 3(2x-1)\cdot t\,\frac{t\,dt}{2x-1} = 3\int t^2\,dt$

$t^2 = 2x^2-2x+3$

$2t\,dt = (4x-2)\,dx \longrightarrow dx = \frac{t\,dt}{2x-1}$

$= 3\cdot\frac{t^3}{3}+K$

$= \boxed{\left(\sqrt{2x^2-2x+3}\right)^3+K}$