UNIVERSIDAD DE CONCEPCIÓN
FACULTAD DE INGENIERÍA AGRÍCOLA
DEPTO. DE AGROINDUSTRIAS
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PAUTA TEST Nº 6 CÁLCULO INTEGRAL + EDO

INGENIERÍA AGROINDUSTRIAL — INGENIERÍA AMBIENTAL — INGENIERÍA EN ALIMENTOS

NOMBRE :_____ NOTA :_____
TIEMPO MÁXIMO : 30 MINUTOS FECHA : Lu 09/06/14

1) Evaluar $\int_0^{ln(2)} \int_0^{ln(5)} e^{2x-y}\, dx\, dy$

(30 puntos).

Solución:

$$\int_0^{ln(5)} e^{2x-y}\, dx = \tfrac{1}{2} e^{2x-y}\Big|_0^{ln(5)} = \tfrac{1}{2}\, e^{2ln(5)-y} - \tfrac{1}{2} e^{-y}$$

$$\int_0^{ln(2)} \int_0^{ln(5)} e^{2x-y}\, dx\, dy = \int_0^{ln(2)} \left[\tfrac{1}{2}\, e^{2ln(5)-y} - \tfrac{1}{2}\, e^{-y} \right] dy =$$

$$\tfrac{1}{2} \int_0^{ln(2)} e^{2ln(5)-y}\, dy - \tfrac{1}{2} \int_0^{ln(2)} e^{-y}\, dy = -\tfrac{1}{2}\, e^{2\,ln(5)-y}\Big|_0^{ln(2)} + \tfrac{1}{2} e^{-y}\Big|_0^{ln(2)} =$$

$$-\tfrac{1}{2}\, e^{2\,ln(5)-ln(2)} + \tfrac{1}{2}\, e^{2\,ln(5)} + \tfrac{1}{2}\, e^{-ln(2)} - \tfrac{1}{2} = -\tfrac{1}{2}(12.5) + \tfrac{1}{2}(25) + \tfrac{1}{2}(0.5) - \tfrac{1}{2} = 6$$

Finalmente $\int_0^{ln(2)} \int_0^{ln(5)} e^{2x-y}\, dx\, dy = 6$ ❑

2) Calcule $\int\int (x-3y)^2\, dA$, donde $R = \{(x,y)/\, 0 \le x \le 2\,,\, 1 \le y \le 2\,\}$

(30 puntos).

Solución:

$$\int\int (x-3y)^2\, dA = \int_0^2 \int_1^2 (x-3y)^2\, dy\, dx$$

$$\int_1^2 (x-3y)^2\, dy = -\tfrac{1}{3}\tfrac{1}{3}(x-3y)^3\Big|_1^2 = -\tfrac{1}{9}\,(x-6)^3 + \tfrac{1}{9}(x-3)^3$$

$$\int_0^2 \int_1^2 (x-3y)^2\, dy\, dx = \int_0^2 \Big[-\tfrac{1}{9}\,(x-6)^3 + \tfrac{1}{9}(x-3)^3 \Big] dx =$$

$$-\tfrac{1}{9}\tfrac{1}{4}(x-6)^4\Big|_0^2 + \tfrac{1}{9}\tfrac{1}{4}(x-3)^4\Big|_0^2 =$$

$$-\tfrac{1}{36}(-4)^4 + \tfrac{1}{36}(-6)^4 + \tfrac{1}{36}(-1)^4 - \tfrac{1}{36}(-3)^4 = -\tfrac{256}{36} + \tfrac{1296}{36} + \tfrac{1}{36} - \tfrac{81}{36} =$$

$$\tfrac{960}{36} = \tfrac{80}{3} \approx 26.67$$

Finalmente

$$\int\int (x-3y)^2\, dA = \tfrac{80}{3}\,, \text{ donde } R = \{(x,y)/\, 0 \le x \le 2\,,\, 1 \le y \le 2\,\}$$ ❑