Parcial 2

Teórico

25, a) Función Laguerre

$$L_2(x) = \frac{e^x}{2!} * \frac{dx^2}{d^2}\left(e^{-x} \cdot x^2\right)$$

$$= \frac{e^x}{2!} * \frac{dx}{d}\left(-e^{-x} x^2 + e^{-x} 2x\right)$$

$$= \frac{e^x}{2!} * \left(e^{-x} x^2 - 2x e^{-x} - e^{-x} 2x + e^{-x} 2\right)$$

$$= \frac{\cancel{e^x} \cancel{e^{-x}}}{2} * \left(x^2 - 4x + 2\right)$$

$$= \frac{1}{2} * \left(x^2 - 4x + 2\right)$$

$$= \frac{1}{2}x^2 - 2x + 1$$

b.) Rodrigues

$$R_1 = \frac{2 + \sqrt{4 - 4/2}}{1} = 2 + \sqrt{2}$$

$$R_2 = 2 - \sqrt{2}$$

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c.

$$w_1 = \int_0^{\infty} e^{-x} \left(\frac{x-(2-\sqrt{2})}{(2+\sqrt{2})-(2-\sqrt{2})} \right) dx$$

$$= 0.1464 \text{ (calculado en sympy)}$$

$$w_2 = \int_0^{\infty} e^{-x} \left(\frac{x-2+\sqrt{2}}{(2-\sqrt{2})-(2+\sqrt{2})} \right) dx$$

$$= 0.8535 \text{ (calculado en sympy)}$$

d.) $\int_0^{\infty} e^{-x} x^3 \, dx$

u		v
x^3	$+$	e^{-x}
$3x^2$	$-$	$-e^{-x}$
$6x$	$+$	e^{-x}
6	$-$	$-e^{-x}$
0		e^{-x}

$$\left(-x^3 e^{-x} - 3x^2 e^{-x} - 6x e^{-x} - 6 e^{-x}\right)\Big|_0^{\infty}$$

evaluando

en $\infty = 0$ $\qquad$ $f(\infty) - f(0) = 6$

en $0 = -6$

$$\int_0^{\infty} e^{-x} x^3 \, dx = 6$$

Y usando Sympy encontramos que $\sum_{i}^{2} w_i f(x_i) = 6$