VIDEO 1.

FRACCIONES PARCIALES

$$X(S) = \frac{2s^3 + 8s^2 + 4s + 8}{S(s+1)(s^2 + 4s + 8)}$$

$$\frac{K_1}{S} + \frac{K_2}{S+1} + \frac{A}{S+2+j2} + \frac{A^*}{S+5-j2}$$

$$K_1 = S \cdot X(S)\Big|_{S=0} \rightarrow \frac{2s^3 + 8s^2 + 4s + 8}{S(S+1)(s^2 + 4s + 8)} = \frac{8}{8} = 1 \rightarrow \boxed{K_1 = 1}$$

$$K_2 = (S+1) \cdot X(S)\Big|_{S=0} \quad \frac{(-1+1)\,2(-1)^3 + 8(-1)^2 + 4(-1) + 8}{(-1)((-1)+1)\,((-1)^2 + 4(-1) + 8)} = \frac{10}{-5} = -2 \quad \boxed{K_2 = -2}$$

$$A = (S+2+j2) \cdot X(S)\Big|_{S=-2-j2} \quad (S+2+j2)$$

$$\frac{2(-2-j2)^3 + 8(-2-j2)^3 + 4(-2-j2) + 8}{(-2-j2)((-2-j2)+1)((-2-j2)^2 + 4(-2-j2) + 8)}$$

Ahora por partes

- $2s^3 = 2(-2-j2)^3 -$

$$= 2[(-2)^3 + 3(-2)^2(-j^2) + 3(-2)(-j2)^2 + (-j2)^3]$$

$$(-j2)^3 = (-1)^3 j^3 2^3$$

$$= -1 \cdot j^2 \cdot j \cdot 8$$

$$= j \cdot 8$$

$$2s^3 = 2[-8-j24+24+j8]$$
$$= [16-j16]$$
$$\boxed{= 2s^3 = 32-j32}$$

$$8s^2 = 8(-2-j2)^2$$
$$8s^2 = j64$$

$$\frac{2s^3+8s^2+4s+8}{S(s+1)(s+2-j2)} = A$$

Numerador.

$$32-j32+64+4(-2-j2)+8 = 32j+j24.$$

Denominador

$$S(s+1)(s+2-j2) = (-2-j2)(-2-j2+1)(-2-j+2+2j2)-24+j8$$

$$A = \frac{32+j24}{24+j8} = \frac{8(4+j3)}{8(3+j)} \quad \text{Eliminamos complejo en el denominador.}$$

$$A = \frac{4+j3}{5+j} \cdot \frac{3-j}{3-j} - \frac{15-j5}{10}$$

$$A = 1.5 - j0.5.$$

$$\frac{K_1}{S} + \frac{K_2}{S+1} + \frac{A}{S+2+j2} + \frac{A^*}{S+2-j2} \Rightarrow \frac{1}{5} + \frac{(-2)}{S+1} + \frac{1.5+j0.5}{S+2+j2} + \frac{1.5-j0.5}{S+2-j2}$$