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Video Ex 1

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

$$= \frac{K_1}{s} + \frac{K_2}{s+1} + \frac{A}{s+2+j2} + \frac{A^*}{s+2-j2}$$

$$K_1 = \left. s X(s) \right|_{s=0} \Rightarrow \left. s \left(\frac{2s^3 + 8s^2 + 4s + 8}{s(s+1)(s^2+4s+8)} \right) \right|_{s=0}$$

$$= \frac{8}{8} = 1 \Rightarrow K_1 = 1$$

$$K_2 = \left. (s+1) X(s) \right|_{s=-1} \Rightarrow \left. (s+1) \left(\frac{2s^3 + 8s^2 + 4s + 8}{s(s+1)(s^2+4s+8)} \right) \right|_{s=-1}$$

$$= \frac{2(-1)^3 + 8(-1)^2 + 4(-1) + 8}{(-1)((-1)^2 + 4(-1) + 8)} = \frac{-2 + 8 - 4 + 8}{(-1)(1 - 4 + 8)} = \frac{10}{-5} = -2 = K_2$$

$$\Rightarrow K_2 = -2$$

$$A = \left. (s+2+j2) X(s) \right|_{s=-2-j2}$$

$$\left. \frac{(s+2+j2)(2s^3 + 8s^2 + 4s + 8)}{s(s+1)(s+2+j2)(s+2-j2)} \right|_{s=-2-j2}$$

$$= \left. \frac{2s^3 + 8s^2 + 4s + 8}{s(s+1)(s+2-j2)} \right|_{s=-2-j2}$$

Por Partes

$$-(-j^2)^3 = j^8$$

$$2s^3 = 2[-2-j2]^3$$

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

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

$$8s^2 = j64$$

Numerador

$$32-j32+j64-j8 \Rightarrow 32+j24$$

Denominador

$$s(s+1)(s+2-j2) = (-2-j2)(-2-j2+1)[-2-j2+2+j2] \\ = 24+j8$$

$$A = \frac{32+j24}{24+j8} = \frac{\cancel{8}(4+j3)}{\cancel{8}(3+j)} \Rightarrow A = \frac{4+j3}{3+j} \cdot \frac{3-j}{3-j} = \frac{15-j5}{10}$$

$$\Rightarrow A = 1,5 - j0,5$$

$$= \frac{1}{s} + \frac{-2}{s+1} + \frac{1,5+j0,5}{s+2+j2} + \frac{1,5-j0,5}{s+2-j2}$$