

Name: Solution

Via partial fraction expansion, find A, B, C:

$$Y(s) = \frac{1}{s(s+2)^2} = \frac{A}{s} + \frac{B}{s+2} + \frac{C}{(s+2)^2}$$

↓  
Repeated Roots

Your Solution:

$$A = s \cdot Y(s) \Big|_{s=0} = s \cdot \frac{1}{s(s+2)^2} \Big|_{s=0} = \boxed{\frac{1}{4}}$$

$$C = (s+2)^2 \cdot Y(s) \Big|_{s=-2} = (s+2)^2 \cdot \frac{1}{s(s+2)^2} \Big|_{s=-2} = \boxed{-\frac{1}{2}}$$

B ⇒

$$\frac{A \cdot (s+2)^2 + B(s+2)s + Cs}{s(s+2)^2} = \frac{1}{s(s+2)^2}$$

$$s^2(A+B) + s(4A+2B+C) + 4A = 1$$

0                      0

$$A = \frac{1}{4}$$

$$B = -A$$
$$\boxed{B = -\frac{1}{4}}$$