

Problem A

Find the inverse Laplace transform of the following functions. You may leave your answer as a convolution of two functions or as an integral.

1) $\frac{1}{s^2(s^2 + 4)}.$

3) $\frac{s}{(s + 2)(s^2 + 9)}.$

2) $\frac{1}{s(s - 2)}.$

4) $\frac{1}{(s - 1)^3(s + 2)^2}.$

Problem B

Solve the following integral equation:

$$y(t) = 1 + \int_0^t y(\tau) d\tau.$$

Problem C

Solve the following integro-differential equations:

1) $y(t) = 1 - \int_0^t (t - \tau)y(\tau) d\tau.$

2) $y'(t) = \sin t + \int_0^t y(t - \tau) \cos \tau d\tau$ avec $y(0) = 1.$

3) $y(t) = te^t - 2e^t \int_0^t e^{-\tau}y(\tau) d\tau.$