

MAT215: Complex Variables And Laplace Transformations

Emon Hossain¹

¹Lecturer
MNS department
Brac University

LECTURE-05

Derivative formula

Example

Show that,

$$\mathcal{L}\{y'(t)\} = sY(s) - y(0)$$

Example

Show that,

$$\mathcal{L}\{y''(t)\} = s^2Y(s) - sy(0) - y'(0)$$

Example

Show that,

$$\mathcal{L}\{y'''(t)\} = s^3Y(s) - s^2y(0) - sy'(0) - y''(0)$$

Example

Example

Solve the given differential equation:

$$y'' - 4y' + 4y = t^3 e^{2t}, y(0) = 0, y'(0) = 0$$

Example

Solve the given differential equation:

$$y'' - 3y' + 2y = 4, y(0) = 1, y'(0) = -1$$

Hint:

$$\frac{s-2}{s(s-1)} = \frac{2}{s} + \frac{-1}{s-1}$$

Example

Example

Solve the given differential equation:

$$y''' - 3y'' + 3y' - y = e^t t^2, y(0) = 0, y'(0) = 1, y''(0) = -2$$

Example

Solve the given differential equation:

$$\frac{dy}{dt} + y = 13\sin 2t, y(0) = 6$$

Hint:

$$\frac{6s^2 + 50}{(s+3)(s^2+4)} = \frac{8}{(s+3)} + \frac{-2s+6}{(s^2+4)}$$