

$$① \frac{dy}{dt} - y = 1, y(0) = 0 \quad / \mathcal{L}$$

$$\mathcal{L}\{y'\} - \mathcal{L}\{y\} = \mathcal{L}\{1\}$$

$$s \cdot \bar{Y} - y(0) - \bar{Y} = \frac{1}{s}$$

$$s \cdot \bar{Y} - 0 - \bar{Y} = \frac{1}{s}$$

$$Y(s-1) = \frac{1}{s}$$

$$\bar{Y} = \frac{1}{s(s-1)}$$

$$\frac{A}{s} + \frac{B}{s-1}$$

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

$$1 = A(s-1) + B \cdot s$$

$$\boxed{s=0}$$

$$1 = -A$$

$$\underline{-1 = A}$$

$$\boxed{s=1}$$

$$1 = B \cdot 1$$

$$\underline{1 = B}$$

$$\bar{Y} = -\frac{1}{s} + \frac{1}{s-1}$$

$$\boxed{y = -1 + e^t}$$

$/ \mathcal{L}^{-1}$

2 $2\frac{dy}{dt} + y = 0, y(0) = -3$

$$\mathcal{L}\{2y'\} + \mathcal{L}\{y\} = \mathcal{L}\{0\}$$

$$\underbrace{2\mathcal{L}\{y'\}} + \mathcal{L}\{y\} = \overset{\downarrow}{0}$$

$$2(sY - y(0)) + Y = 0$$

$$2(sY + 3) + Y = 0$$

$$2sY + 6 + Y = 0$$

$$2sY + Y = -6$$

$$Y(2s+1) = -6$$

$$Y = \frac{-6}{2s+1}$$

$$\boxed{\mathcal{L}\{0\} = 0}$$

$$Y = \frac{-6}{2(s+\frac{1}{2})}$$

$$Y = \frac{-3}{s+\frac{1}{2}}$$

$$Y = -3 \cdot \frac{1}{s+\frac{1}{2}}$$

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$$y = -3 \cdot e^{-\frac{1}{2}t}$$

$$\boxed{y = -3e^{-t/2}}$$