

12장 연습문제

1.

$$(a) \mathcal{L} \{ e^{at} \} = \int_0^{\infty} e^{-st} e^{at} dt = \int_0^{\infty} e^{-(s-a)t} dt = \frac{1}{s-a}$$

$$(b) \mathcal{L} \{ \sin bt \} = \int_0^{\infty} e^{-st} \sin bt dt = \frac{b}{s^2 + b^2}$$

3.

$$(a) \mathcal{L} \{ f(t) \} = \frac{e^{-3s} + 1}{s}$$

$$(b) \mathcal{L} \{ g(t) \} = \frac{2e^{-5s} + e^{-2s}}{s}$$

5.

$$(a) \mathcal{L} \{ t^4 e^{2t} \} = \frac{24}{(s-2)^5}$$

$$(b) \mathcal{L} \{ 3e^{-5t} \} = \frac{3}{s+5}$$

$$(c) \mathcal{L} \{ \cos t e^{4t} \} = \frac{s-4}{(s-4)^2 + 1}$$

$$(d) \mathcal{L} \{ \sin t e^{-7t} \} = \frac{1}{(s+7)^2 + 1}$$

7.

$$(a) \mathcal{L} \{ t \cos 2t \} = -\frac{d}{ds} \left(\frac{s}{s^2 + 4} \right) = \frac{s^2 - 4}{(s^2 + 4)^2}$$

$$(b) \mathcal{L} \{ t^3 e^{4t} \} = -\frac{d^3}{ds^3} \left(\frac{1}{s-4} \right) = \frac{6}{(s-4)^4}$$

9.

$$(a) \mathcal{L}^{-1} \{ F(s) \} = \frac{1}{6} t^4 e^{-3t}$$

$$(b) \mathcal{L}^{-1} \{ G(s) \} = \frac{1}{60} t^5 e^{4t}$$

11.

$$(a) y(t) = \frac{1}{8} (3 \sin t - \sin 3t)$$

$$(b) y(t) = \frac{4}{3} e^{-t} - \frac{1}{3} e^{-4t}$$