① Text 15-3c

$$x(t) = 3e^{-3t}u(t-2)$$ (change the exponent of e^{-3t} to get $e^{-3(t-2)}$)

$$= 3e^{-6}e^{-3(t-2)}u(t-2)$$

so

$$3e^{-6}e^{-3t}u(t) \longleftrightarrow \frac{3e^{-6}}{s+3}$$

$$3e^{-6}e^{-3(t-2)}u(t-2) \longleftrightarrow \boxed{\frac{3e^{-6}e^{-2t}}{s+3} \quad \text{ROC: } Re(s) > -3}$$

② Text 15-6c

$$x(t) = \frac{d}{dt}\left[4\sin 10\pi t\, u(t)\right]$$

$$4\sin 10\pi t\, u(t) \longleftrightarrow \frac{4(10\pi)}{s^2+(10\pi)^2} \quad Re(s) > 0$$

$$\frac{d}{dt}\left[4\sin 10\pi t\, u(t)\right] \longleftrightarrow \boxed{\frac{40\pi s}{(s^2+(10\pi)^2)} \quad Re(s) > 0}$$

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(3) Text 15-30 a, c

(a) $g(t) = 5\sin[2\pi(t-1)]\,u(t-1)$

$$5\sin(2\pi t)u(t) \longleftrightarrow 5\cdot\frac{2\pi}{s^2+(2\pi)^2} \quad Re(s)>0$$

$$5\sin(2\pi(t-1))\,u(t-1) \longleftrightarrow \boxed{\frac{10\pi e^{-s}}{s^2+(2\pi)^2} \quad Re(s)>0}$$

(c) $g(t) = 2\cos(10\pi t)\cos 100\pi t\, u(t)$

$$= \cos(2\pi 110 t)\, u(t) + \cos(2\pi 90 t)u(t)$$

$$g(t) \longleftrightarrow G(s) = \boxed{\frac{s}{s^2+(110\pi)^2} + \frac{s}{s^2+(90\pi)^2} \quad Re(s)>0}$$