

1. (a)  $\frac{6}{s^2+9} + \frac{1}{s^2} - \frac{5}{s+1}, \quad s > 0;$   
(b)  $\frac{s-2}{(s-2)^2+25}, \quad s > 2;$   
(c)  $\frac{1}{(s-3)^2}, \quad s > 3;$   
(d)  $\frac{\pi}{s} - \frac{5 \cdot 10!}{(s+1)^{11}}, \quad s > 0;$   
(e)  $\frac{6s}{(s^2+1)^2} - \frac{1}{s^2+1}, \quad s > 0;$   
(f)  $\frac{1}{s^2+1} + \frac{e^{-\pi s}}{s^2+1}, \quad s > 0;$   
(g)  $e^{-2s} \frac{2!}{(s-2)^3}, \quad s > 2.$
2. (a)  $2 \cosh(3t) = e^{3t} + e^{-3t}, \quad t \geq 0;$   
(b)  $\frac{t^6}{180}, \quad t \geq 0;$   
(c)  $t e^{-3t}, \quad t \geq 0;$   
(d)  $\frac{1}{3}e^t - \frac{1}{3}e^{-2t}, \quad t \geq 0;$   
(e)  $\frac{e^{-2t}}{\sqrt{2}} \sin(\sqrt{2}t), \quad t \geq 0;$   
(f)  $e^{2t} \left( 3 \cos(3t) + \frac{5}{3} \sin(3t) \right), \quad t \geq 0.$   
(g)  $\frac{4}{3}e^t + \frac{8}{3}e^{-2t} + \frac{1}{3}H_1(t)e^{t-1} - \frac{1}{3}H_1(t)e^{-2t+2};$   
(h)  $\frac{1}{4}t \sin(2t).$
3. (a)  $\frac{10!}{2^{11}};$       (b)  $\frac{3}{50}.$
4.  $f(t) = \frac{1}{3}e^t + \frac{5}{3}e^{-2t}.$
5. (a)  $\frac{s^2-16}{(s^2+16)^2} - \frac{2s}{s^2+16} + \frac{s+2}{(s+2)^2+16}, \quad s > 0;$   
(b)  $e^{2t} \left( 2 \cos(\sqrt{2}t) + \frac{3}{\sqrt{2}} \sin(\sqrt{2}t) \right), \quad t \geq 0.$   
(c)  $\frac{1}{4}e^t - \frac{1}{4}e^{-t} \cos(2t) + \frac{3}{4}e^{-t} \sin(2t), \quad t \geq 0.$
6. -

$$7. \left(1 - \frac{t}{2}\right) \operatorname{sen} t.$$

$$8. \quad (\text{a}) \quad x(t) = \frac{3}{10} \operatorname{sen} t - \frac{1}{10} \cos t - \frac{9}{10} e^{\frac{t}{3}};$$

$$(\text{b}) \quad y(t) = \frac{1}{3} \operatorname{sen}(6t) - \cos(6t);$$

$$(\text{c}) \quad y(t) = t - \frac{2}{3} + \frac{2}{3\sqrt{2}} e^{-t} \operatorname{sen}(\sqrt{2}t) + \frac{2}{3} e^{-t} \cos(\sqrt{2}t);$$

$$(\text{d}) \quad y(x) = \frac{1}{2} (x^2 - 4x + 8) - 2e^{-x}(x + 2);$$

$$(\text{e}) \quad y(t) = \frac{e^{-t}}{2} (e^t - t - 1).$$

$$9. \quad y(t) = (t - \pi)^2 + 2\pi(t - \pi) + \pi^2 - 1 + \cos(t - \pi) = t^2 - 1 - \cos t.$$

$$10. \quad \begin{cases} x(t) = 2e^{-t} + 3e^{4t} \\ y(t) = 3e^{-t} - 3e^{4t} \end{cases}.$$