1. (a) $\dfrac{6}{s^2+9} + \dfrac{1}{s^2} - \dfrac{5}{s+1}$, $\quad s > 0$;

    (b) $\dfrac{s-2}{(s-2)^2+25}$, $\quad s > 2$;

    (c) $\dfrac{1}{(s-3)^2}$, $\quad s > 3$;

    (d) $\dfrac{\pi}{s} - \dfrac{5 \cdot 10!}{(s+1)^{11}}$, $\quad s > 0$;

    (e) $\dfrac{6s}{(s^2+1)^2} - \dfrac{1}{s^2+1}$, $\quad s > 0$;

    (f) $\dfrac{1}{s^2+1} + \dfrac{e^{-\pi s}}{s^2+1}$, $\quad s > 0$;

    (g) $e^{-2s}\dfrac{2!}{(s-2)^3}$, $\quad s > 2$.

2. (a) $2\cosh(3t) = e^{3t} + e^{-3t}$, $\quad t \geq 0$;

    (b) $\dfrac{t^6}{180}$, $\quad t \geq 0$;

    (c) $t\,e^{-3t}$, $\quad t \geq 0$;

    (d) $\dfrac{1}{3}e^t - \dfrac{1}{3}e^{-2t}$, $\quad t \geq 0$;

    (e) $\dfrac{e^{-2t}}{\sqrt{2}}\,\mathrm{sen}\,(\sqrt{2}t)$, $\quad t \geq 0$;

    (f) $e^{2t}\left(3\cos(3t) + \dfrac{5}{3}\mathrm{sen}\,(3t)\right)$, $\quad t \geq 0$.

    (g) $\dfrac{4}{3}\,e^t + \dfrac{8}{3}\,e^{-2t} + \dfrac{1}{3}\,H_1(t)e^{t-1} - \dfrac{1}{3}\,H_1(t)e^{-2t+2}$;

    (h) $\dfrac{1}{4}\,t\,\mathrm{sen}\,(2t)$.

3. (a) $\dfrac{10!}{2^{11}}$; $\qquad$ (b) $\dfrac{3}{50}$.

4. $f(t) = \dfrac{1}{3}e^t + \dfrac{5}{3}e^{-2t}$.

5. (a) $\dfrac{s^2-16}{(s^2+16)^2} - \dfrac{2s}{s^2+16} + \dfrac{s+2}{(s+2)^2+16}$, $\quad s > 0$;

    (b) $e^{2t}\left(2\cos(\sqrt{2}\,t) + \dfrac{3}{\sqrt{2}}\,\mathrm{sen}\,(\sqrt{2}\,t)\right)$, $\quad t \geq 0$.

    (c) $\dfrac{1}{4}\,e^t - \dfrac{1}{4}\,e^{-t}\cos(2t) + \dfrac{3}{4}\,e^{-t}\,\mathrm{sen}\,(2t)$, $\quad t \geq 0$.

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

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

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

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

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

   (e) $y(t) = \dfrac{e^{-t}}{2}\left(e^t - t - 1\right).$

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

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