1. $F(s) = \frac{1}{s-5}$

$$F(t) = \mathcal{L}^{-1} \frac{1}{s-5}$$

$$= e^{5t}$$

2. $F(s) = \frac{1}{s^5}$

$$F(t) = \mathcal{L}^{-1} \frac{1}{s^5}$$

$$= \mathcal{L}^{-1} \frac{1}{s^{4+1}}$$

$$= \frac{t^4}{4!}$$

3. $F(s) = \frac{s^3 - 5s^2 + 6}{s^4}$

$$F(t) = \mathcal{L}^{-1} \frac{s^3 - 5s^2 + 6}{s^4}$$

$$= \mathcal{L}^{-1}\frac{1}{s} - 5\,\mathcal{L}^{-1}\frac{1}{s^{1+1}} + 6\cdot\mathcal{L}^{-1}\frac{1}{s^{3+1}}$$

$$= 1 - 5\cdot\frac{t^1}{1!} + 6\cdot\frac{t^3}{3!}$$

$$= 1 - 5t + \frac{6t^3}{3!}$$

4. $F(s) = \frac{2+4s}{s^2+25}$

$$F(t) = \mathcal{L}^{-1}\frac{2+4s}{s^2+25}$$

$$= 2\cdot\mathcal{L}^{-1}\frac{1}{s^2+5^2} + 4\,\mathcal{L}^{-1}\frac{s}{s^2+5^2}$$

$$= \frac{2}{5}\mathcal{L}^{-1}\frac{5}{s^2+5^2} + 4\,\mathcal{L}^{-1}\frac{s}{s^2+5^2}$$

$$= \frac{2}{5}\sin 5t + 4\cos 5t$$

3. $F(s) = \dfrac{s-2}{(s-2)^2 - 16}$

$$F(t) = \mathcal{L}^{-1} \frac{s-2}{(s-2)^2 - 16}$$

$$= e^{2t} \mathcal{L}^{-1} \frac{s}{s^2 - 4^2}$$

$$= e^{2t} \cosh 4t$$

4. $F(s) = \dfrac{s}{s^2 + 4s - 9}$

$$F(t) = \mathcal{L}^{-1} \frac{s}{s^2 + 4s - 9}$$

$$= \mathcal{L}^{-1} \frac{s}{s^2 + 2 \cdot s \cdot 2 + 2^2 - 4 - 9}$$

$$= \mathcal{L}^{-1} \frac{s}{(s+2)^2 - 13}$$

$$= \mathcal{L}^{-1} \frac{s+2-2}{(s+2)^2-13}$$

$$= \mathcal{L}^{-1} \frac{(s+2)}{(s+2)^2-(\sqrt{13})^2} - 2 \cdot \frac{1}{\sqrt{13}} \mathcal{L}^{-1} \frac{\sqrt{13}}{(s+2)^2-(\sqrt{13})^2}$$

$$= e^{-2t} \mathcal{L}^{-1} \frac{s}{s^2-(\sqrt{13})^2} - \frac{2}{\sqrt{13}} e^{-2t} \mathcal{L}^{-1} \frac{\sqrt{13}}{s^2-(\sqrt{13})^2}$$

$$= e^{-2t} \cosh(\sqrt{13}t) - \frac{2}{\sqrt{13}} e^{-2t} \sinh(\sqrt{13}t)$$

5. $$F(s) = \frac{5s-7}{s^2-6s+25}$$

$$F(t) = \mathcal{L}^{-1} \frac{5s-7}{s^2-6s+25}$$

$$= \mathcal{L}^{-1} \frac{5s-7}{s^2-2 \cdot 3 \cdot s+3^2-9+25}$$

$$= \mathcal{L}^{-1} \frac{5(s-3)+15-7}{(s-3)^2+16}$$

$$= \mathcal{L}^{-1} \frac{5(s-3)+8}{(s-3)^2+4^2}$$

$$= 5\mathcal{L}^{-1} \frac{s-3}{(s-3)^2+4^2} + 2\mathcal{L}^{-1} \frac{4}{(s-3)^2+4^2}$$

$$= 5 \cdot e^{3t} \mathcal{L}^{-1} \frac{s}{s^2+4^2} + 2 \cdot e^{3t} \mathcal{L}^{-1} \frac{4}{s^2+4^2}$$

$$= 5 \cdot e^{3t} \cdot \cos 4t + 2 \cdot e^{3t} \sin 4t$$

6. $F(s) = \dfrac{s}{s^2-6s+10}$

$$F(t) = \mathcal{L}^{-1} \frac{s}{s^2-6s+10}$$

$$= \mathcal{L}^{-1} \frac{s}{s^2 - 2 \cdot s \cdot 3 + 3^2 - 9 + 10}$$

$$= \mathcal{L}^{-1} \frac{s}{(s-3)^2 + 1}$$

$$= \mathcal{L}^{-1} \frac{s-3+3}{(s-3)^2 + 1}$$

$$= \mathcal{L}^{-1} \frac{(s-3)}{(s-3)^2 + 1^2} + 3 \mathcal{L}^{-1} \frac{1}{(s-3)^2 + 1^2}$$

$$= e^{3t} \mathcal{L}^{-1} \frac{s}{s^2 + 1^2} + 3 \cdot e^{3t} \mathcal{L}^{-1} \frac{1}{s^2 + 1^2}$$

$$= e^{3t} \cos t + 3 e^{3t} \sin t$$