Given the following F(s), find f(t) using Inverse Laplace Transforms.

1. $\frac{s+5}{s^2+3s+2}$

$$\frac{s+5}{s^2+3s+2} = \frac{s+5}{(s+1)(s+2)} = \frac{A}{s+1} + \frac{B}{s+2}$$

$\frac{-1+5}{-1+2} = 4$ $\frac{-2+5}{-2+1} = -3$

$$f(t) = [4e^{-t} - 3e^{-2t}]\,u(t)$$

2. $\frac{-5s-7}{(s+2)^2}$

$$\frac{-5s-7}{(s+2)^2} = \frac{A}{(s+2)^2} + \frac{B}{s+2}$$

$$A = -5(-2) - 7 = 3$$

$$B = \frac{d}{ds}(-5s-7)\Big|_{s=-2} = -5$$

$$f(t) = (3t-5)e^{-2t}\,u(t)$$

3. $\frac{4s}{s^2+6s+13}$

$$\frac{4s}{s^2+6s+13} \quad \text{poles: } \frac{-6 \pm \sqrt{6^2-4\cdot 13}}{2} = -3 \pm j2$$

$$= \frac{4s}{(s+3-j2)(s+3+j2)} = \frac{A}{s+3-j2} + \frac{A^*}{s+3+j2}$$

$$A = \frac{4(-3+j2)}{(-3+j2)+3+j2} = \frac{-12+j8}{j4} = 2+j3 = 3.61\angle 56.3^\circ$$

$$f(t) = 2|A|e^{-dt}\cos(\omega t + \theta)$$

$$= 7.22e^{-3t}\cos(2t + 56.3^\circ)\,u(t)$$