1.

$$F(s)=\frac{s+4}{s(s-1)(s-5)}=\frac{A}{s}+\frac{B}{s-1}+\frac{C}{s-5}=\frac{\frac{4}{5}}{s}+\frac{\frac{5}{-4}}{s-1}+\frac{\frac{9}{20}}{s-5}$$

$$A=\lim_{s\to 0} sF(s)=\frac{4}{(-1)(-5)}=\frac{4}{5}$$

$$B=\lim_{s\to 1}(s-1)F(s)=\frac{5}{(1)(-4)}=\frac{5}{-4}$$

$$C=\lim_{s\to 5}(s-5)F(s)=\frac{9}{(5)(4)}=\frac{9}{20}$$

$$\mathrm{Re}(s)>5\to f(t)=\frac{4}{5}u(t)+\frac{5}{-4}e^{t}u(t)+\frac{9}{20}e^{5t}u(t)$$

$$\mathrm{Re}(s)<0\to f(t)=-\frac{4}{5}u(-t)+\frac{5}{4}e^{t}u(-t)-\frac{9}{20}e^{5t}u(-t)$$

$$0<\mathrm{Re}(s)<1\to f(t)=\frac{4}{5}u(t)+\frac{5}{4}e^{t}u(-t)-\frac{9}{20}e^{5t}u(-t)$$

$$1<\mathrm{Re}(s)<5\to f(t)=\frac{4}{5}u(t)+\frac{5}{-4}e^{t}u(t)-\frac{9}{20}e^{5t}u(-t)$$

2.

$$x(t)\to X(\omega)$$

$$e^{2jt}x(t)\to X(\omega-2)$$

$$e^{2jt}x(t)=\frac{1}{2\pi}\int_{-\infty}^{\infty}X(\omega-2)e^{j\omega t}d\omega$$

$$t=\frac{1}{2}\to e^{j}x(\frac{1}{2})=\frac{1}{2\pi}\int_{-\infty}^{\infty}X(\omega-2)e^{\frac{j\omega}{2}}d\omega$$

$$\int_{-\infty}^{\infty}X(\omega-2)e^{\frac{j\omega}{2}}d\omega=2\pi ex(\frac{1}{2})=3\pi e^{j}$$

3.

الف)

$$X(s)=\frac{1}{s-3},\mathrm{Re}(s)>3$$

$$Y(s)=H(s)X(s),R_1\bigcap R_2$$

$$Y(s)=\frac{s+8}{(s-4)(s-2)(s-3)},3<\mathrm{Re}(s)<4$$

$$Y(s)=\frac{A}{s-4}+\frac{B}{s-2}+\frac{C}{s-3}=\frac{6}{s-4}+\frac{5}{s-2}-\frac{11}{s-3}$$

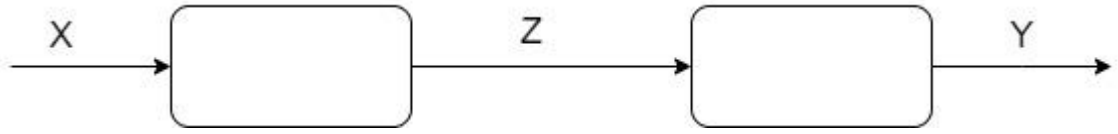
$$A=\lim_{s\to 4}(s-4)Y(s)=\frac{(12)}{(2)(1)}=6$$

$$B=\lim_{s\to 2}(s-2)Y(s)=\frac{(10)}{(-2)(-1)}=5$$

$$C=\lim_{s\to 3}(s-3)Y(s)=\frac{(11)}{(-1)(1)}=-11$$

$$y(t)=-6e^{4t}u(-t)+5e^{2t}u(t)-11e^{3t}u(t)$$

ب)



$$H(s)=\frac{s+8}{(s-4)}\frac{1}{(s-2)}$$

$$Z=\frac{s+8}{(s-4)}X\to sZ-4Z=sX+8X\to\frac{dz}{dt}-4z=\frac{dx}{dt}+8x$$

$$Y=\frac{1}{(s-2)}Z\to sY-2Y=Z\to\frac{dy}{dt}-2y=z$$