3.1(a) $z[(\frac{1}{2})^n u[n]]=\sum_{n=0}^{\infty}(\frac{1}{2})^n z^{-n}=\sum_{n=0}^{\infty}(\frac{1}{2z})^n=\frac{1}{1-\frac{1}{2}z^{-1}}, |z|>\frac{1}{2}$

(d) $z[\delta[n]]=z^0=1$, all z

(g) $z[(\frac{1}{2})^n(u[n]-u[n-10])]=\sum_{n=0}^{9}(\frac{1}{2z})^n=\frac{1-(2z)^{-10}}{1-(2z)^{-1}}, |z|>0$

3.5

$$\begin{aligned}X(z)&=(1+2z)(1+3z^{-1})(1-z^{-1})\\&=2z+5-4z^{-1}-3z^{-2}\\&=\sum_{n=-\infty}^{\infty}x[n]z^{-n}\end{aligned}$$

$$x[n]=2\delta[n+1]+5\delta[n]-4\delta[n-1]-3\delta[n-2]$$

3.7

$$x[n]=u[-n-1]+(\frac{1}{2})^n u[n]$$

$$X(z)=\frac{-1}{1-z^{-1}}+\frac{1}{1-\frac{1}{2}z^{-1}}, \frac{1}{2}<|z|<1$$

$$H(z)=\frac{Y(z)}{X(z)}=\frac{\frac{-1}{2}z^{-1}}{(1-\frac{1}{2}z^{-1})(1+z^{-1})}\frac{(1-z^{-1})(1-\frac{1}{2}z^{-1})}{\frac{-1}{2}z^{-1}}=\frac{1-z^{-1}}{1+z^{-1}}, |z|>1$$

3.14

$$\begin{aligned}H(z)&=\frac{1}{1-\frac{1}{4}z^{-2}}\\&=\frac{1}{(1-\frac{1}{2}z^{-1})(1+\frac{1}{2}z^{-1})}\\&=\frac{0.5}{1-\frac{1}{2}z^{-1}}+\frac{0.5}{1+\frac{1}{2}z^{-1}}\end{aligned}$$

$$h[n]=\frac{1}{2}(\frac{1}{2})^n u[n]+\frac{1}{2}(\frac{-1}{2})^n u[n], A_1=\frac{1}{2}, \alpha_1=\frac{1}{2}, A_2=\frac{1}{2}, \alpha_2=\frac{-1}{2}$$

3.19(a) $|z|>\frac{1}{2}$

(b) $\frac{1}{3}<|z|<2$