Q#2. Solution

(a) Roc of $Y(z)$ $\quad \frac{1}{2} < |z| < 2$

(b) two-sided since it's Roc is a ring.

(c) $|z| > \frac{3}{4}$

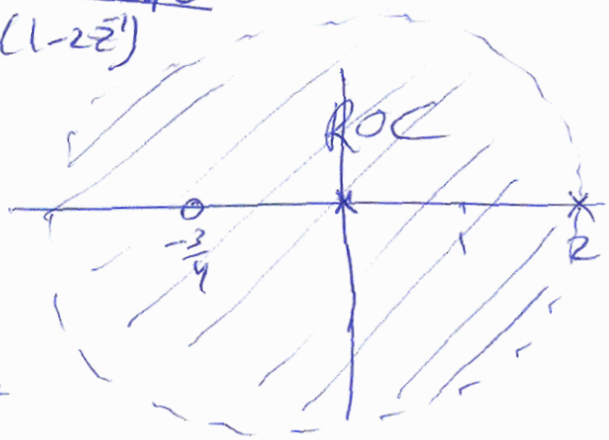
(d) Yes, it is causal since it's Roc extends from outermost pole to ∞

(e) $$Y(z) = \frac{A\left(1-\frac{1}{4}z^{-1}\right)z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1-2z^{-1}\right)}, \quad X(z) = \frac{B\left(1-\frac{1}{4}z^{-1}\right)}{\left(1-\frac{1}{2}z^{-1}\right)\left(1+\frac{3}{4}z^{-1}\right)}$$

$$H(z) = \frac{Y(z)}{X(z)} = \frac{A}{B}\cdot\frac{\left(1-\frac{1}{4}z^{-1}\right)z^{-1}\left(1-\frac{1}{2}z^{-1}\right)\left(1+\frac{3}{4}z^{-1}\right)}{\left(1-\frac{1}{4}z^{-1}\right)\left(1-\frac{1}{2}z^{-1}\right)\left(1-2z^{-1}\right)}$$

zeros: at $z = -\frac{3}{4}$

poles: at $z = 2$, $z = 0$



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input is stable and output is stable

therefore $\Rightarrow$ System should be stable, too.

$\Rightarrow$ unit circle should be inside it's Roc

$\Rightarrow$ Roc is $|z| < 2$.

(f) system is anticausal since it's Roc doesn't extends from outermost pole towards ∞.