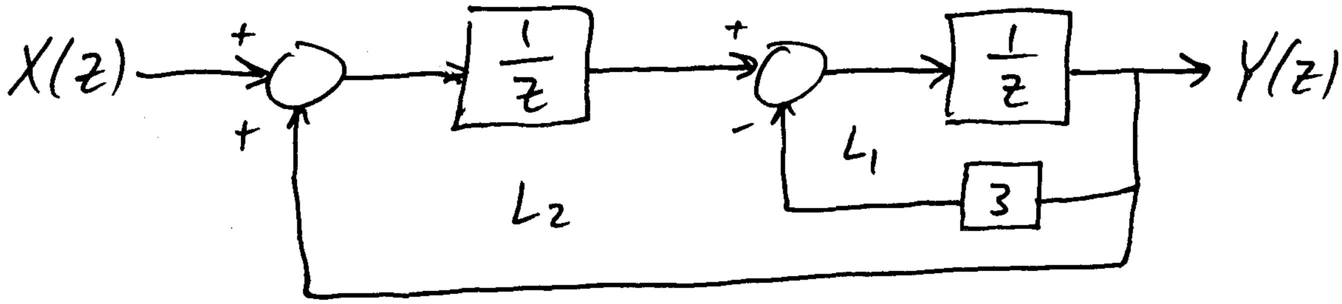
Example- Find the system transfer function *H*(*z*) using Mason's Theorem.



Only one forward path $P_1(z) = \frac{1}{z}\left(\frac{1}{z}\right) = \frac{1}{z^2}$

Loop 1 $\quad L_1(z) = \frac{1}{z}(3)(-1) = -3/z$

Loop 2 $\quad L_2(z) = \frac{1}{z}\left(\frac{1}{z}\right)(1) = 1/z^2$

Note, $L_1(z)$ and $L_2(z)$ touch. Forward path $P_1(z)$ touches <u>both</u> $L_1(z)$ & $L_2(z)$.

System determinant is then

$$\Delta(z) = 1 - \sum_{i=1}^{2} L_i(z) + 0^{\text{non touching}}$$

$$= 1 - \left[L_1(z) + L_2(z)\right]$$

$$= 1 + 3/z - \frac{1}{z^2}$$

$$H(z) = \frac{\sum_{i=1}^{1} P_i(z)\,\Delta_i(z)}{\Delta(z)} = \frac{P_1(z)\,\Delta_1(z)}{\Delta(z)}$$

and

$\Delta_1(z) = 1$ since both loops touch $P_1(z)$

$$H(z) = \frac{1/z^2\,(1)}{1 + 3/z - \frac{1}{z^2}}$$

$$\underline{\underline{H(z) = \frac{1}{z^2 + 3z - 1}}} \Rightarrow \text{Same answer!}$$