Step-1

We get

$$\begin{aligned}(y,1-y)A &= (y,1-y)\begin{bmatrix}3 & 4 & 1\\ 2 & 0 & 3\end{bmatrix}\\ &= \left(3y+2(1-y),4y,y+3(1-y)\right)\\ &= (y+2,4y,3-2y)\end{aligned}$$

Step-2

Equating $y+2$ and 4*y*, we get $y=\frac{2}{3}$. For this value of *y*, we get

$$\begin{aligned}(y+2,4y,3-2y) &= \left(\frac{2}{3}+2,4\left(\frac{2}{3}\right),3-2\left(\frac{2}{3}\right)\right)\\ &= \left(\frac{8}{3},\frac{8}{3},\frac{5}{3}\right)\end{aligned}$$

The maximum value is $\frac{8}{3}$.

Step-3

Equating $y+2$ and $3-2y$, we get $y=\frac{1}{3}$. For this value of *y*, we get

$$\begin{aligned}(y+2,4y,3-2y) &= \left(\frac{1}{3}+2,4\left(\frac{1}{3}\right),3-2\left(\frac{1}{3}\right)\right)\\ &= \left(\frac{7}{3},\frac{4}{3},\frac{7}{3}\right)\end{aligned}$$

The maximum value is $\frac{7}{3}$.

Step-4

Equating $3-2y$ and 4*y*, we get $y=\frac{1}{2}$. For this value of *y*, we get

$$(y+2,4y,3-2y)=\left(\frac{1}{2}+2,4\left(\frac{1}{2}\right),3-2\left(\frac{1}{2}\right)\right)$$
$$=\left(\frac{5}{2},2,2\right)$$

The maximum value is $\frac{5}{2}$.

Step-5

Out of $\frac{8}{3}$, $\frac{7}{3}$, and $\frac{5}{2}$, the least value is $\frac{7}{3}$. Therefore, the best strategy of *Y* will have $y=\frac{1}{3}$.

Thus, we have $y^*=\frac{1}{3}$. Naturally, for the best strategy of *X*, *X* should get the amount $\frac{7}{3}$.

Step-6

Thus, *X* will combine the columns of *A* to obtain the value $\frac{7}{3}$. Consider the following:

$$\frac{2}{3}(y+2)+0(4y)+\frac{1}{3}(3-2y)=\frac{2y}{3}+\frac{4}{3}+1-\frac{2y}{3}$$
$$=\frac{7}{3}$$

Therefore, *X* chooses the three columns in the frequencies $\frac{2}{3},0,\frac{1}{3}$.