

## Question 1

Question 1

$X = 6, 3, 1, 2, 4$   
 $L, F, F, L, L$

$$\frac{1}{2} \times P(6|L)P(L|F)P(3|F)P(F|F)P(1|F)P(F|L)P(2|L)P(L|L)P(4|L)$$

$$\frac{1}{2} \times \left(\frac{1}{2}\right)(0.4)\left(\frac{1}{6}\right)(0.6)\left(\frac{1}{6}\right)(0.4)\left(\frac{1}{10}\right)(0.6)\left(\frac{1}{10}\right)$$

$$= \left(\frac{1}{2}\right)^2 (0.4)^2 \left(\frac{1}{6}\right)^2 (0.6)^2 \left(\frac{1}{10}\right)^2$$

$$= \left(\frac{1}{4}\right)\left(\frac{4}{25}\right)\left(\frac{1}{36}\right)\left(\frac{9}{25}\right)\left(\frac{1}{100}\right)$$

$$= 4 \times 10^{-6}$$

## Question 2

Question 2

$X = 4, 6, 3$

$K \backslash t$	$t=1$	$t=2$	
$K=1$	$\frac{1}{6} \cdot \frac{1}{2}$	$\frac{1}{6} \max(0.6 \cdot \frac{1}{12}, 0.4 \cdot \frac{1}{20})$	$\frac{1}{6} \max(0.6 \cdot \frac{1}{120}, 0.4 \cdot \frac{1}{60})$
(fair)	$= \frac{1}{12}$	$= \frac{1}{120}$	$= \frac{1}{900}$
$K=2$	$\frac{1}{10} \cdot \frac{1}{2}$	$\frac{1}{10} \max(0.4 \cdot \frac{1}{12}, 0.6 \cdot \frac{1}{20})$	$\frac{1}{10} \max(0.4 \cdot \frac{1}{120}, 0.6 \cdot \frac{1}{60})$
(loaded)	$= \frac{1}{20}$	$= \frac{1}{60}$	$= \frac{1}{1000}$
	$\Downarrow$ 4	$\Downarrow$ 6	$\Downarrow$ 3

  

$K \backslash t$	$t=1$	$t=2$	$t=3$
$K=1$	0	$\max(0.6 \cdot \frac{1}{12}, 0.4 \cdot \frac{1}{20})$	$\max(0.6 \cdot \frac{1}{120}, 0.4 \cdot \frac{1}{60})$
(fair)		$= \frac{1}{20}$	$= \frac{1}{150}$
$K=2$	0	$\max(0.4 \cdot \frac{1}{12}, 0.6 \cdot \frac{1}{20})$	$\max(0.4 \cdot \frac{1}{120}, 0.6 \cdot \frac{1}{60})$
(loaded)		$= \frac{1}{30}$	$= \frac{1}{100}$

$P(X, Z^*) = \max\left(\frac{1}{900}, \frac{1}{1000}\right) = \frac{1}{900}$   
 Fair, Loaded, Fair sequence

## Question 3

