Note Title 3/21/2011

HW10Q2 Prob 5.3

X can be $-1, 1$ w. prob $\frac{1}{4}, \frac{3}{4}$

$Y = X$ w. prob $1-p-p_e$

$= -X$ w. prob p.

$= 0$ w. prob p_e

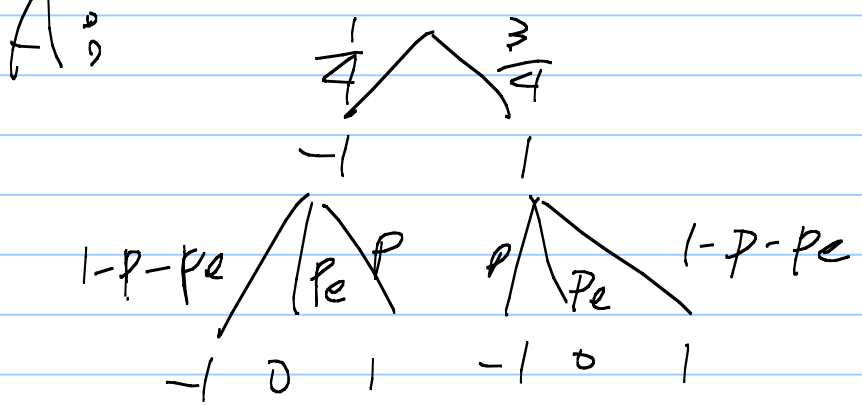
Q: S_{XY}

A: S_{XY}

	-1	0	1
-1	$\frac{1}{4}(1-p-p_e)$	$\frac{1}{4} \times p_e$	$\frac{1}{4} \times p$
$+1$	$\frac{3}{4} \times p$	$\frac{3}{4} \times p_e$	$\frac{3}{4} \cdot (1-p-p_e)$

Q: Weight assignment

A:



Q: $P(X \neq Y)$

Ans: $\frac{1}{4}p_e + \frac{1}{4}p + \frac{3}{4}p + \frac{3}{4}p_e = p + p_e$

Q: $P(Y=0)$

Ans: $\frac{1}{4}p_e + \frac{3}{4}p_e = p_e$.

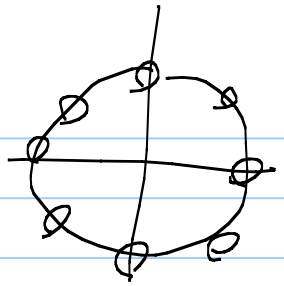
HW10Q7 Prob 5.12

$$X = r\cos\left(\frac{2\pi(\Theta+1)}{8}\right)$$

$$Y = r\sin\left(\frac{2\pi(\Theta+1)}{8}\right)$$

Θ: uniformly distributed on $\{0, 1, 2, \cdots 7\}$.

Q: $S_{X+Y} = ?$



Ans:

X \ Y	$-1\cdot r$	$-\sqrt{2}/2\cdot r$	0	$\sqrt{2}/2\cdot r$	$1\cdot r$
$-1\cdot r$			$1/8$		
$-\sqrt{2}/2\cdot r$		$1/8$		$1/8$	
0	$1/8$				$1/8$
$\sqrt{2}/2\cdot r$		$1/8$		$1/8$	
$1\cdot r$			$1/8$		

Q: W.A Ans: ↑

Q: Marginal prob of X

Ans: $$P(X=x)=\begin{cases}\frac{1}{8} & \text{if } x=-r, r\\ \frac{1}{4} & \text{if } x=-\frac{\sqrt{2}}{2}r, 0, \frac{\sqrt{2}}{2}r\\ 0 & \text{otherwise.}\end{cases}$$

$$P(Y=y)=\begin{cases}\frac{1}{8} & \text{if } y=-r, r\\ \frac{1}{4} & \text{if } y=-\frac{\sqrt{2}}{2}r, 0, \frac{\sqrt{2}}{2}r\\ 0 & \text{otherwise.}\end{cases}$$

Q: $P(X=0)$. Ans: $\frac{1}{4}$

Q: $P(X \le \frac{r}{\sqrt{2}})$. Ans: $\frac{1}{8}$

Q: $P(X \ge \frac{r}{\sqrt{2}}$ and $Y \ge r/\sqrt{2})$. Ans: $\frac{1}{8}$

Q: $P(X < -\frac{r}{\sqrt{2}})$ Ans: $\frac{1}{8}$