		The state of the s	1 Marie 15 2033 3/27/15
	Homework 7		
1.	a) X	- de	2
	a -1 0 1		
	P(a) 1/4 2/4 1/4		
	$a \cdot p(a) - 1/4 = 0 = E[X]$	7 8	
		-)	
	Y= X <sup>2</sup>		
	b 0 1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1		
	p(b) 2/4 2/4	TX.	
	b.p(b) 0 2/4 \( \Sigma = 1/2 = E[Y] \)	• <u> </u>	
		A 3	
	A 1500		
	-1 0 1 $P(Y=b)$	4	
	b 0 0 2/4 0 2/4		
· ·	1 14 0 14 24		4
	P(X=a) 1/4 2/4 1/4 1	<u> </u>	
	I) ( AND ETWY) ETWELD	A AT	
	b) (ov(x,y)= E[xy] - E[x] E[y]	(A'A H	
	E[XY] = (-1)(1)(1/4) + (0)(0)(2/4) + (1)(1)(1/4)	- Fula 7	
	= -1/4 + 0 + 1/4	5 1 V 1 3	
	F O	7 A 194	
		1-	
	Cov(X,Y) = 0 - (0)(1/2)	2/2/2/14	
	Cov(X,Y) = O	13	
	COULTY!		
(3) (2)	()	-Tyxla /	
	c) $\rho(X,Y) = (ov(X,Y)) = 0$ $\sqrt{Var(X) Var(Y)} = \sqrt{Var(X) Var(Y)}$		
	P(X,Y) = 0		
	X and Y are uncorrelated		
	(#) (#) (#) (#)	3 TX I 3	
	d) X and Y are dependent	TEXYL	
	$P(X=-1,Y=0)=0 \neq P(X=-1)P(Y=0)=(1/4)(2/4)$	= 1/8	

	Shoulder the state of the state
2.	a) a compared to the compared
	-1 0 1 1 0 1 - 1 1
	4 2-16 2 0
	4 λ-i6 λ O b 5 $\frac{1}{8}$ to $\frac{1}{4}$
	b 5   ½ 1/6   ½   ½ - λ
	$\frac{1}{16} + \frac{1}{16} + \frac{1}{8} + \frac{1}{16} + \frac{1}{8} + \frac{1}{4} - \frac{1}{8} = 1$ $2\lambda + \frac{2}{16} + \frac{4}{16} + \frac{2}{16} + \frac{4}{16} = 1$
	$2\lambda + \frac{2}{16} + \frac{4}{16} + \frac{2}{16} + \frac{4}{16} = 1$
	$2\lambda + \frac{12}{16} = \frac{16}{16}$
	$2\lambda = \frac{4}{16} = \frac{1}{4}$ $\lambda = \frac{1}{8}$
	b) a (1) (1) (1)
	1-1 () 1 P(Y=b)
	4 16 2 0 3
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	6 16 16 16 16
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
	c) $E[X] = (-1)(\frac{5}{16}) + (0)(\frac{5}{16}) + (1)(\frac{6}{16}) = -\frac{5}{16} + \frac{6}{16} = \frac{1}{16}$ $E[Y] = (4)(\frac{3}{16}) + (5)(\frac{7}{16}) + (6)(\frac{6}{16}) = \frac{12}{16} + \frac{35}{16} + \frac{36}{16} = \frac{83}{16}$
	$E[Y] = (4)(\frac{3}{16}) + (5)(\frac{7}{16}) + (6)(\frac{6}{16}) = \frac{12}{16} + \frac{35}{16} + \frac{36}{16} = \frac{83}{16}$
	$V_{ar}(X) = E[X^2] - (E[X])^2 = \frac{11}{16} - (\frac{1}{16})^2 = \frac{175}{256} - \frac{175}{256} = \frac{175}{256}$
	$E[\chi^{2}] = (-1)^{2} (\frac{5}{16}) + (0)^{2} (\frac{5}{16}) + (1)^{2} (\frac{6}{16}) = \frac{5}{16} + \frac{6}{16} = \frac{11}{16}$
	$Var(Y) = E[Y^{2}] - (E[Y])^{2} = \frac{439}{16} - (\frac{83}{16})^{2} = \frac{7024}{256} - \frac{6889}{256} = \frac{135}{256}$ $E[Y^{2}] = (4)^{2}(\frac{3}{16}) + (5)^{2}(\frac{7}{16}) + (6)^{2}(\frac{6}{16}) = \frac{48}{16} + \frac{175}{16} + \frac{216}{16} = \frac{439}{16}$
	$E[Y^2] = (4)^2 (\frac{3}{16}) + (5)^2 (\frac{7}{16}) + (6)^2 (\frac{6}{16}) = \frac{48}{16} + \frac{175}{16} + \frac{216}{16} = \frac{434}{16}$
	d) E[XY]= (-1)(4)(16)+(0)(4)(2)+(1)(4)(0)+(-1)(5)(2)+(0)(5)(16)
	$+(1)(5)(\frac{4}{16})+(-1)(6)(\frac{2}{16})+(0)(6)(\frac{2}{16})+(1)(6)(\frac{2}{16})$
	$= -\frac{4}{16} - \frac{10}{16} + \frac{20}{16} - \frac{12}{16} + \frac{12}{16}$
	$=\frac{C_0}{1(c_0)}=\frac{3}{8}$
	$E[X] E[Y] = (\frac{1}{16})(\frac{83}{16}) = \frac{83}{256}$
	[E[XY] \ \ E[X] E[Y]
	8 = (N) (N) = (0 = 1) P(1 = 0) = (N) (N) = 18

Koby M. We Els 2083 Stanfis

```
e) E[X+Y] = (-1+4)(\frac{1}{16}) + (0+4)(\frac{2}{16}) + (1+4)(0) + (-1+5)(\frac{2}{16}) + (0+5)(\frac{1}{16}) + (1+5)(\frac{4}{16}) + (-1+6)(\frac{2}{16}) + (0+6)(\frac{2}{16}) + (1+6)(\frac{2}{16}) + (1
                 [E[X+Y] = E[X] + E[Y]
f) (OV(X_1Y) = E[XY] - E[X]E[Y]
= \frac{3}{8} - \frac{83}{256}
= \frac{96}{256} - \frac{83}{256}
= \frac{13}{256}
                            P(X,Y) = Cov(X,Y)
                                                                                              Var(x) Var(y)
                               X and Y are positively correlated
 a) P(\chi = 1, \gamma = 4) = 0

0 \neq (\frac{6}{16})(\frac{3}{16})
                                                                                                                                                           P(X=1) = \frac{G}{16} P(Y=4) = \frac{3}{16}
                                      X and Y are dependent
    extra credit:
       Var(XY) = E[(XY)^2] - (E[XY])^2 = \frac{310}{16} - (\frac{3}{8})^2 = \frac{1240}{64} - \frac{9}{64} = \frac{1231}{64} = 19.234
                         E[XY] = \frac{3}{8}
E[(XY)^{2}] = (-1.4)^{2} (\frac{1}{16}) + (0.4)^{2} (\frac{2}{16}) + (1.4)^{2} (0) + (-1.5)^{2} (\frac{2}{16})
+ (0.5)^{2} (\frac{1}{16}) + (1.5)^{2} (\frac{4}{16}) + (-1.6)^{2} (\frac{2}{16}) + (0.6)^{2} (\frac{2}{16})
                                                                                               = \frac{16(\frac{1}{16}) + 0 + 0 + 25(\frac{2}{16}) + 0 + 25(\frac{4}{16}) + 36(\frac{2}{16}) + 0 + 36(\frac{2}{16})}{16 + \frac{50}{16} + \frac{100}{16} + \frac{72}{16} + \frac{72}{16}}
                                                                                                =\frac{310}{16}=19.375
```

	(175 \ (135 \ 23625
*(3)	$Var(X) \cdot Var(Y) = \left(\frac{175}{256}\right) \left(\frac{135}{256}\right) = \frac{23625}{65536} = 0.360$
	Var(XY) ≠ Var(X) Var(Y)
	Var(XY) + Var(X) Var(Y)
	Var(X+Y) = Var(X) + Var(Y) + 2Cou(X,Y)
	$Var(X+Y) = Var(X) + Var(Y) + 2(ou(X,Y))$ $= (\frac{175}{256}) + (\frac{135}{256}) + 2(\frac{13}{256}) = \frac{336}{256} = \frac{21}{16}$
	since $Cov(X,Y) \neq 0$ , $Var(X+Y) \neq Var(X) + Var(Y)$
	$\rho(X,Y) = \frac{1}{2} \left( $
	3 400 1440 174
	1.1.44 WILLIAM THE THE PARTY OF
	SV80 0 = 1 = 1
	to the property of the second
	\$ = (N=10 1 - 2 = (1-2/24 - 2 - 0 - (1-2/2+2)) 6
	「一直は   一直   一直   一直   一直   一直   一直   一直
	The state of the state of the X
	Fibility at E(s)
1925.91	場 よ - 台班:・ (4) - 景 : 首(19713) - 「Yxxx 13 - (Yx) nel/
	the state of the s
( \$ ) ( 2	14 (a) (r 1) + (±) (+ a) + (±) (m + ) = [*(m/1]]
(3)16	(a) + (a) (a) + (a) (a) + (a) (a o) + (a)
3 ) NE + O +	まると、 (ま) *
	375.375