Chapter 10

10.1
a)

	X			
Y	0	16		
0	.25	.25	0.5
8	.25	0	0.25
16	0	.25	0.25
	0.5	0.5	

b)
$E[X] = 0×0.5 + 16 ×0.5 = 8$
$E[Y] = 0×0.5 + 8×0.25 + 16×0.25 = 6$

$E[XY] = 0.25×0×0 + 0.25×16×0 + 0.25×8×0 + 0×8×16+0×0×16 + .25×16×16= 64$

$Cov(X,Y) = E[XY] – E[X]E[Y] = 64 - 8×6 = 16$

 c)
$Var(X) = .5×(0 – 8)^2 + 0.5×(16-8)^2 = 64$
$Var(Y) = 0.5×(0 – 6)^2 + 0.25(8 – 6)^2 + 0.25×(16-6)^2 = 44$
Correlation coefficient $= Cov(X,Y) / sqrt(Var(X)Var(Y)) =$
$16/sqrt(64*44) = 16/53.07 = 0.302$

10.5
a)

		a		
b	0	1	2	
0	8/72	6/72	10/72	1/3
1	12/72	9/72	15/72	½
2	4/72	3/72	5/72	1/6
	1/3	¼	30/72	

b)
$E[X[= 1/3×0 + ¼×1 + 30/72×2 = 1.08$
$E[Y] = 1/3×0 + 1/2×1 + 1/6×2 = 5/6$
Ignoring the data from the first row and the first column, where we are multiplying by 0's,
$E[XY] = 1×1×9/72 + 1×2×15/72 + 2×1×4/72 + 2×2×5/76 = .93$

$Cov(X,Y) = .93 – 0.89 = 0.04$

10.8
a)
$Var(X) = E[X^2] - (E[X])^2$
So $E[X^2] = Var(X) + (E[X])^2 = 4 + 4 = 8$

b)
$E[-2X^2 + Y] = E[Y] - 2E[X^2] = 3 - 2*8 = -13$

10.11
$Cov(rX + s, tY + u) = rtCov(X, Y)$

$T = 9/5X + 32$
$S = 9/5X + 32$

So $Cov(T,S) = 9/5 \times 9/5 \times Cov(X,Y) = 3 \times 81/25 = 9.72$

Since the correlation coefficient does not change with changing units, it is still 0.8