1.39 Table 1.3

		y = 0	y = 1	
x	0	1/3	1/3	2/3
	1	0	1/3	1/3
		1/3	2/3	

(a) $H[x] = -\int P(x)\ln(P(x))\,dx$

$= -\frac{2}{3}\ln(\frac{2}{3}) - \frac{1}{3}\ln(\frac{1}{3})$

$H[y] = -\int P(y)\ln(P(y))\,dy$

$= -\frac{1}{3}\ln(\frac{1}{3}) - \frac{2}{3}\ln(\frac{2}{3})$

$H[y|x] = -\iint P(y,x)\ln P(y|x)\,dy\,dx$

$= -(P(0,0)\ln P(0|0) + P(0,1)\ln P(0|1)$
$+ P(1,0)\ln(1|0) + P(1,1)\ln P(1,1))$

$= -(\frac{1}{3}\ln\frac{1}{2} + 0\cdot 0 + \frac{1}{3}\ln\frac{1}{2} + \frac{1}{3}\ln 1)$

$H[x|y] = -\iint P(x,y)\ln P(x|y)\,dx\,dy$

$= -(P(0,0)\ln P(0|0) + P(0,1)\ln P(0|1)$
$+ P(1,0)\ln P(1|0) + P(1,1)\ln P(1|1))$

$= -(\frac{1}{3}\cdot\ln(1) + \frac{1}{3}\ln(\frac{1}{2}) + 0\cdot\ln(\frac{1}{2}) + \frac{1}{3}\ln(\frac{1}{2}))$

$H[x,y] = -\iint P(x,y)\ln P(x,y)\,dx\,dy$

$= -(\frac{1}{3}\ln\frac{1}{3} + \frac{1}{3}\ln(\frac{1}{3}) + 0 + \frac{1}{3}\ln(\frac{1}{3}))$

$I[x,y] = H[x] - H[x|y] = H[y] - H[y|x]$