Statistics - HW5 - Problem 1:

p(t = 0)	0,9998
p(t = 1)	0,0002

p(e = 0)	0,99
p(e = 1)	0,01

p(a = 0|t, e)	t = 0	t = 1
e = 0	1	0
e = 1	0,9	0
p(a = 1|t, e)	t = 0	t = 1
e = 0	0	1
e = 1	0,1	1

p(r|e)	e = 0	e = 1
r = 0	1	0,5
r = 1	0	0,5

p(t, e, a, r) = p(a|t, e) * p(r|e) * p(t)* p(e)

p(t, e, a, r)	a = 0, r = 0	a = 0, r = 1	a = 1, r = 0	a = 1, r = 1
t = 0, e = 0	0,989802	0	0	0
t = 0, e = 1	0,0044991	0,0044991	0,0004999	0,0004999
t = 1, e = 0	0	0	0,000198	0
t = 1, e = 1	0	0	0,000001	0,000001

p(t = 1|a = 1) ?

We need marginalize p(t, e, a, r) to exclude e, r:

(page 49 - Marginal Distributions - All of statistics)

p(t, a)	a = 0	a = 1
t = 0	0,9988002	0,0009998
t = 1	0	0,0002

p(t = 1|a = 1) = p(t = 1, a = 1) / p(a = 1)

p(t = 1, a = 1) = p(a = 1, t = 1): 0,0002

p(a = 1) = p(a = 1 | t = 0) + p(a = 1 | t = 1)

p(a = 1): 0,0011998

p(t = 1|a = 1) = p(t = 1, a = 1) / p(a = 1)

p(t = 1|a = 1): 0,1666944

p(t = 1|a = 1, r = 1) ?

p(t, a, r)	a = 0, r = 0	a = 0, r = 1	a = 1, r = 0	a = 1, r = 1
t = 0	0,9943011	0,0044991	0,0004999	0,0004999
t = 1	0	0	0,000199	0,000001

p(t = 1|a = 1, r = 1) = p(t = 1, a = 1, r = 1) / p(a = 1, r = 1)
p(t = 1, a = 1, r = 1): 0,000001
p(a = 1, r = 1) = p(a = 1, r = 1 | t = 0) + p(a = 1, r = 1 | t = 1)
p(a = 1, r = 1): 0,0005009

p(t = 1|a = 1, r = 1) : 0,0019964