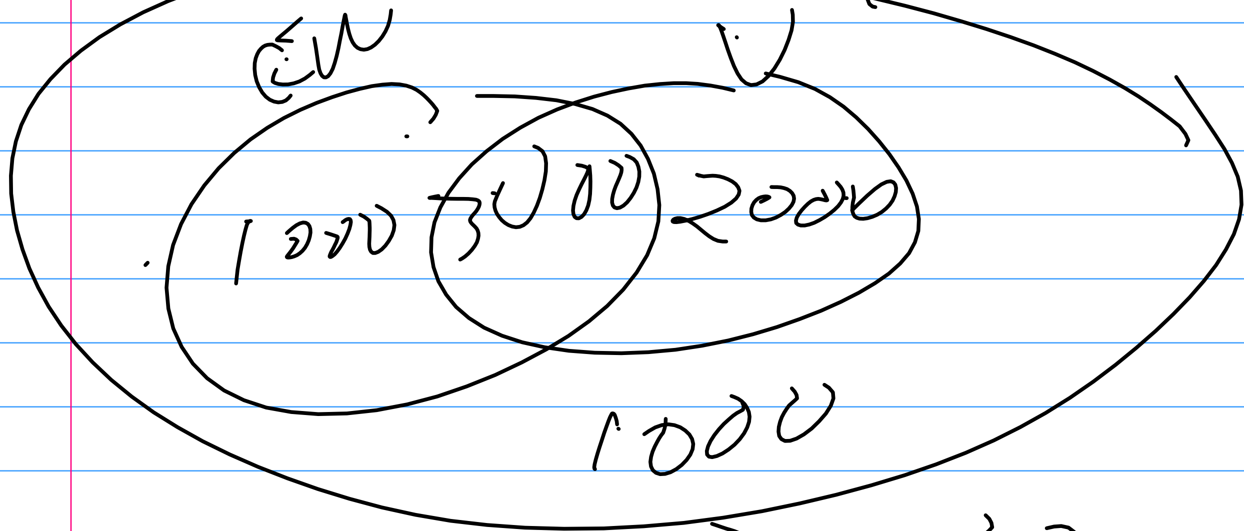
2/1/18 p1



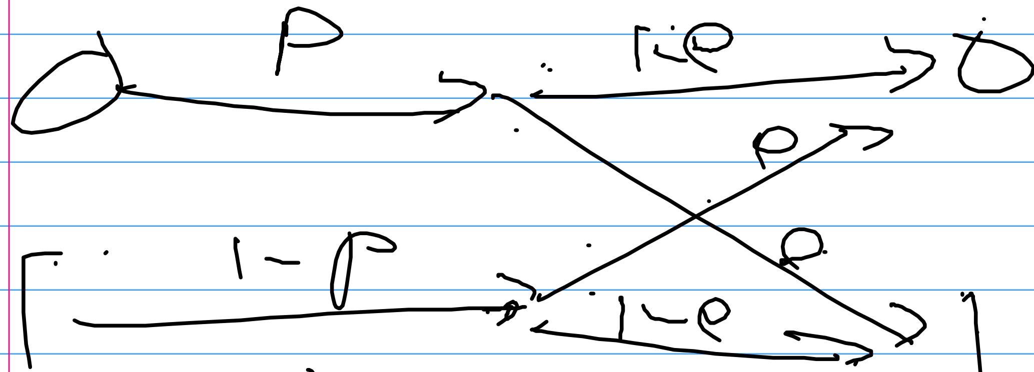
$$P(A \cap B) = P(A|B)\,P(B)$$

$$\tfrac{3}{7} \qquad \tfrac{3}{5} \qquad \tfrac{5}{7}$$

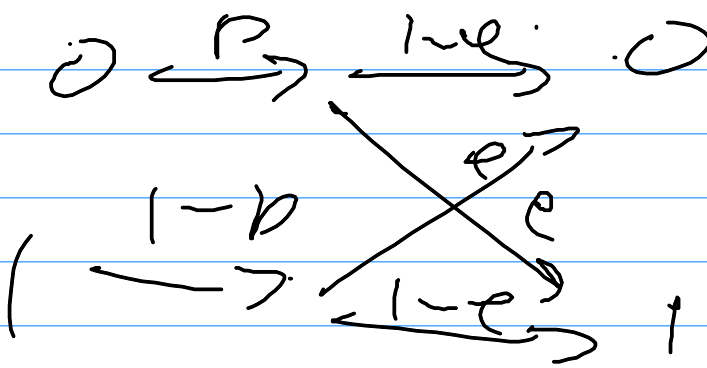
$$= P(B|A)\,P(A)$$

$$\tfrac{3}{4} \qquad \tfrac{4}{7}$$

2.26 erroroneous comm
xmit 0 wp p   error wp e



$$P(\text{REC } 1) = pe + (1-p)(1-e)$$



$$P(R1) = \cancel{p}\, pe + (1-p)(1-e)$$

$$p(R1 \mid T0) = e$$

$$p(R1 \mid T1) = 1-e$$

$$p(T0) = p \qquad p(T1) = 1-p$$

$$p(R1) = p(T0)\,p(R1 \mid T0) = pe$$

$$+ P(T1)\,P(R1 \mid T1) = (1-p)(1-e)$$

$$P(R1 \wedge T1) = P(T1)\,P(R1 \mid T1) = (1-p)(1-e)$$

$$= P(R1)\,P(T1 \mid R1)$$

$$= [pe + (1-p)(1-e)]\,P(T1 \mid R1)$$

$$P(T1 \mid R1) = \frac{P(R1 \wedge T1)}{P}$$

$p(T0) = p \qquad p(T1) = 1-p$

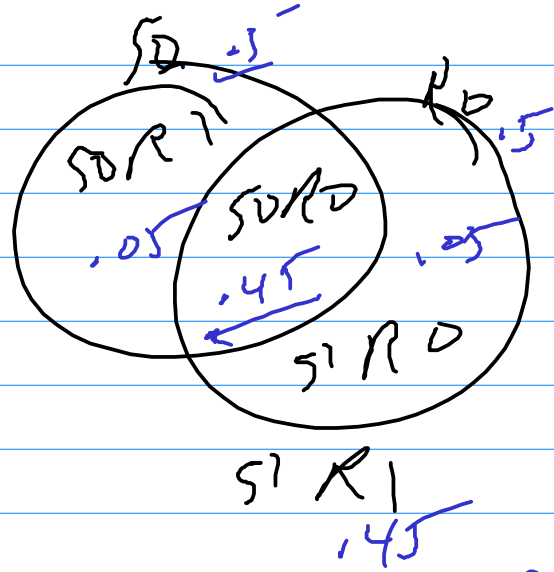
$p(R1 \mid T0) = e = p(R0 \mid T1)$

$p(T0 \land R1) = pe$

$p(T0 \mid R1) \cancel{\times} p(R1) = p(T0 \land R1)$

$pe + (1-p)(1-e) \qquad pe$

$$p(T0 \mid R1) = \frac{pe}{pe + (1-p)(1-e)}$$



transmission:
A: send 0
B: rec 0
givens: P(A) = .5
P(B|A) = .9
P(A and B) = P(A) P(B|A) = .5 .9 = .45
= P(A|B) P(B)
need P(B)

P(B) = P(A and B) + P(A' and B)

P(A' and B) = P(B|A') P(A') = .1 .5 = .05
P(B) = .45 +.05 = .5

P(A|B) = .45 / .5 = .9

$$P(R0|S0) = \frac{P(R0 \cap S0)}{P(S0)} = .9$$

.

$$P(S0|R0) = \frac{P(R0 \cap S0)}{P(R0)} = .9$$

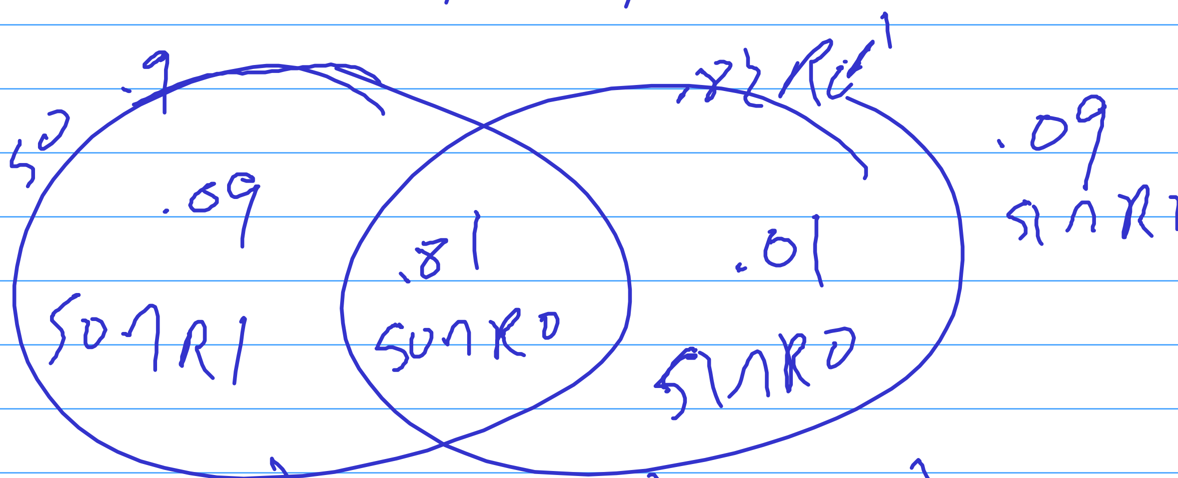
5

$P(S0) = .9$

$P(S0') = .1$

$P(R0|S0) = .9$

$P(\cancel{R0}\, R1|S1) = .9$



$P(R1 \cap S1) = \underset{.9}{P(R1|S1)}\ \underset{.1}{P(S1)} = .09$

$P(S0|R0) = P(S0 \cap R0) / P(R0)$

$= .81 / .82 \approx .99$

$P(S1|R1) = P(S1 \cap R1) / P(R1) = .09/.18 = \frac{1}{2}$

medical test
A: horrible disease
B: test was positive
P(A) = 0.001
P(B|A) = .9
P(B|A') = .01
want P(A|B)?
P(B) = .001 * .9 + .999 * .01 = .01
P(A and B) = P(B|A) P(A) = .0009
 = P(A|B) P(B)
P(A|B) = .0009 / .01 = .001 / .01 = .1

here B, wiki B0
here B' wiki B1
B0 union B1 =S (universe, i.e. every possible outcome) P(S) =1

P(B0|A) = P(B0 and A) / P(A)
  .9 =   P(B0 and A) / .001
P(B0 and A) = .0009 = .001