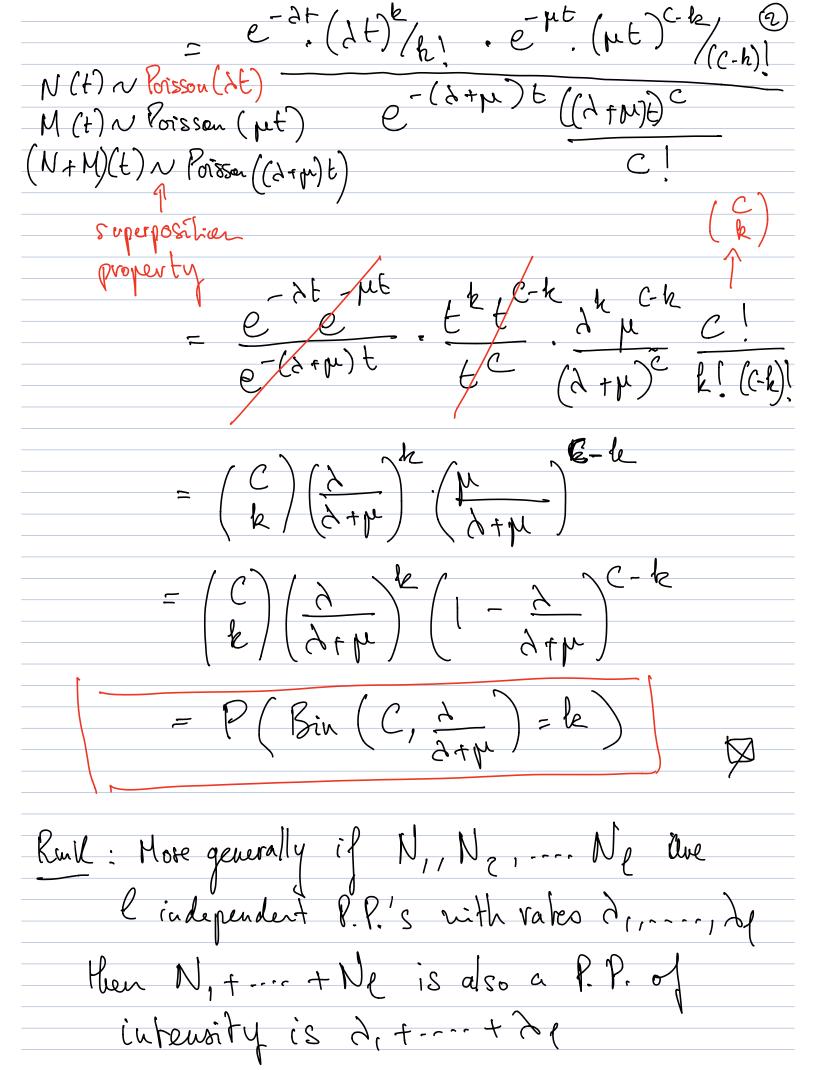
March (1) lecal: (Superposition) Let N(t) and M(t) be independent PP's of intensity 2, , 2, then N+M is a PP of intensity 2, +2 Ex: Cars traveling on a highway $N(t) = \# \text{ cars going east up to } t \rightarrow P.P.(\lambda)$ $M(t) = \frac{1}{2} \text{ west } -\frac{1}{2} \text{ P.P.(}\mu)$ Q: What is the dishibution of N(f), given that = N(f) + M(f) = C? A: Interibrely Biromal (C, 2+ m) More precisely: Y(N(E) = k | N(E) + M(E) = C) = P(N(t)=k, M(t)=C-N(t)) P(N(t)+M(t)=C) = P(N(f)=k,M(t)=C-k) P(N(t)+M(t)=C) = P(N(E)=k)P(M(F)=(-k) P(N(+) + M(+) = C)



The following property is a kind of reciprocal (3)
The following property is a kind of reciprocal (3) of the superposition property
Prop (Thinning): Suppose that each arrival of a P.P. N(t) (with rate 2) is classified
a P.P. N(t) (with rate of) is classified
or labelled of either type) or type 2 independently with probability p and 1-p, respectively
respectively
· Let N, (f) = # of type leverts by hime to · Let Nz(f) = - 2
Then N, and No are Poisson processes with
Then N, and No are Poisson processes with rates Ap and A(1-p), respectively
Proof: To see this, we check that N, and N2 Salisfy the second definition (4 axioms)
satisfy the second definition (4 axious)
$1) N_1(0) = 0$
2) Independent increment property.
2) Independent increment property. $N_1(f) - N_1(s)$ is a function of $N(f) - N(s)$ for $f > s$. So the independe of increments for $N(f) - N(s)$ $f > s$ same for $N(f) - N(s)$
for E>s. So the judepence of incremits for N
=> same for N,

