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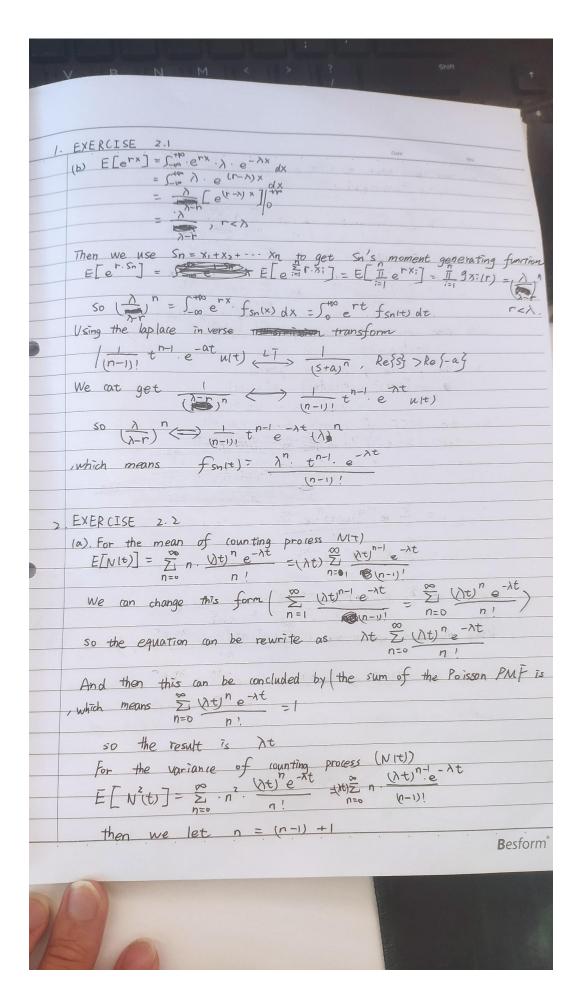
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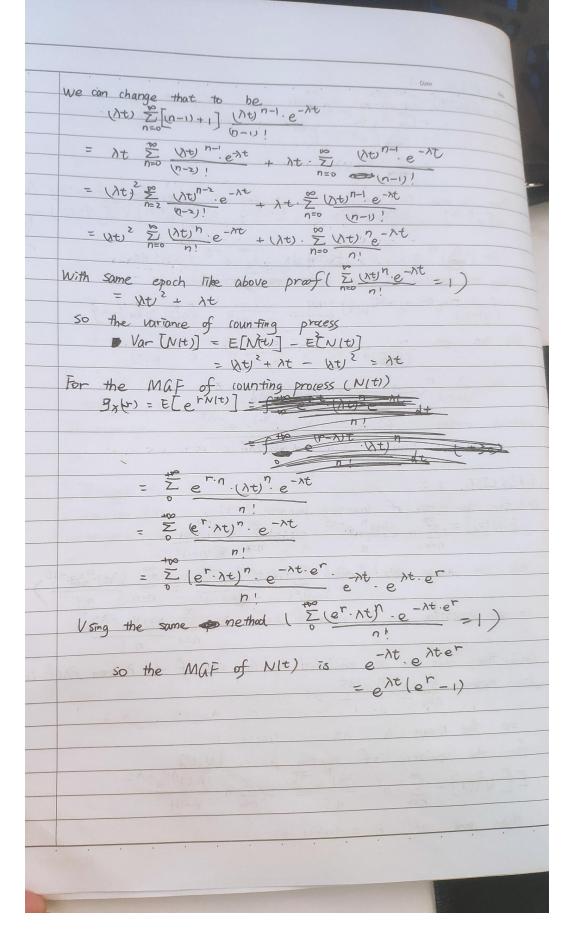
Subject: Stochastic process

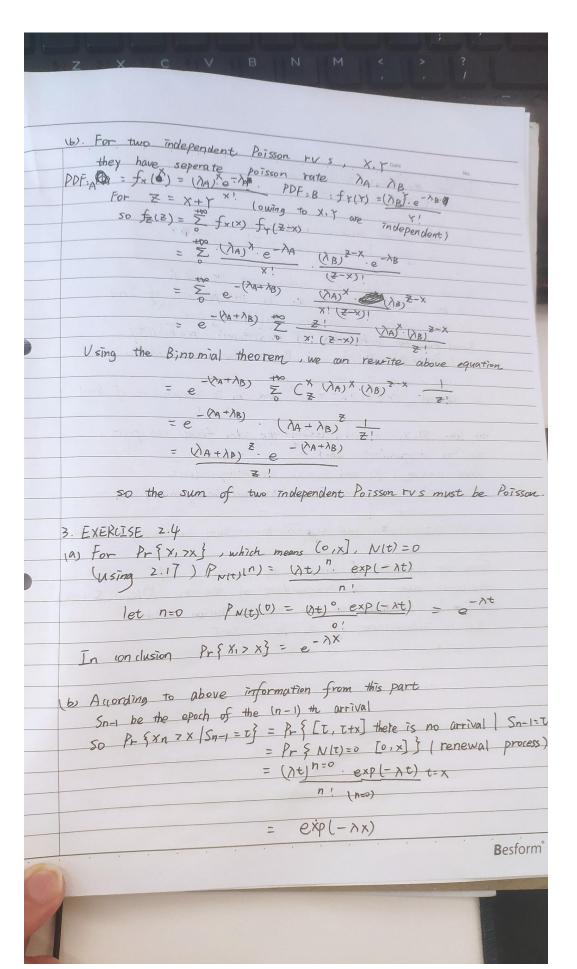
Assignment: Homework Five

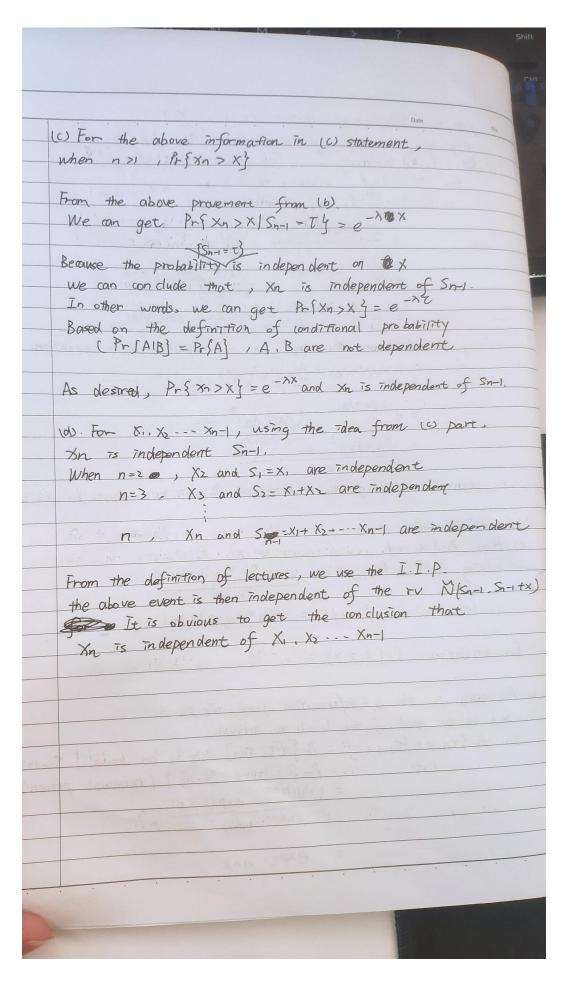
Date: Feb 26th

Prof: Vincent Tan.



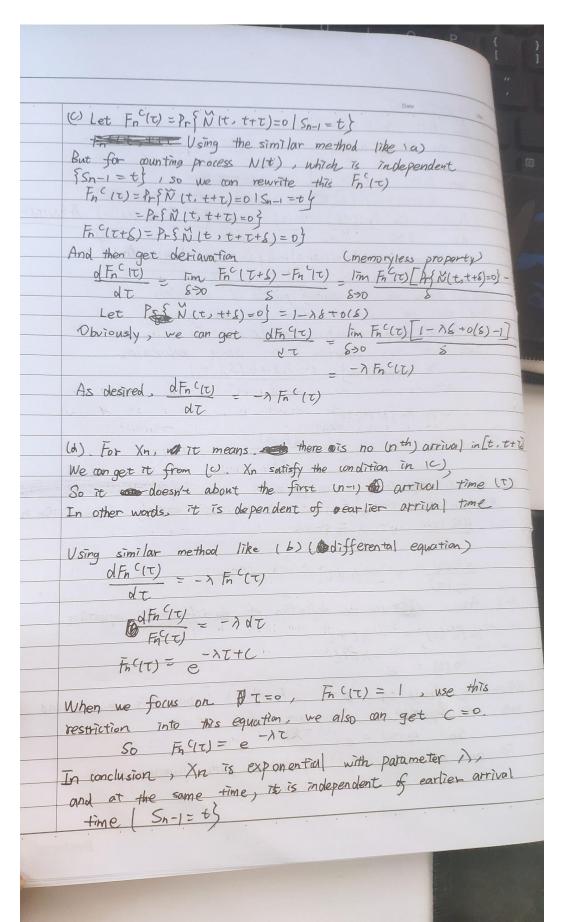


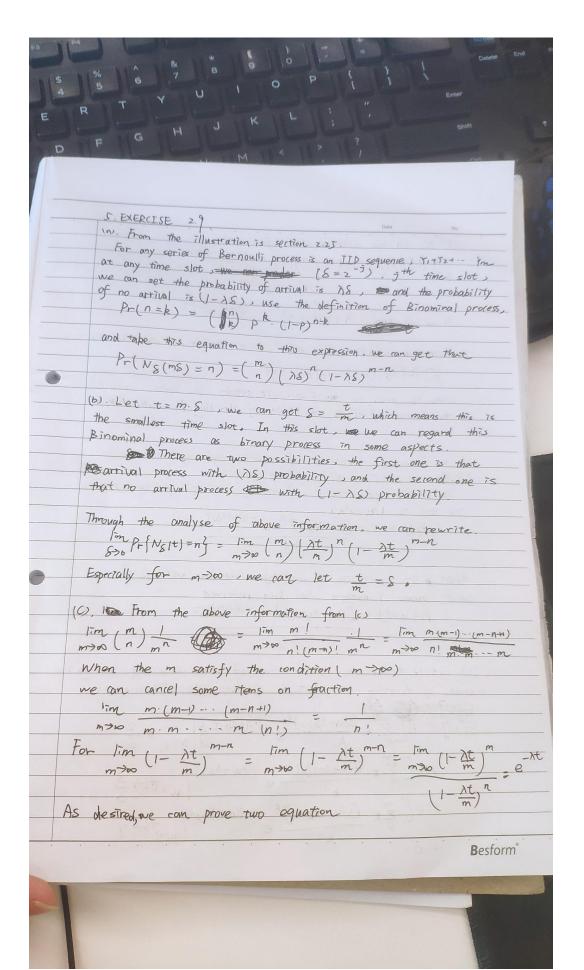


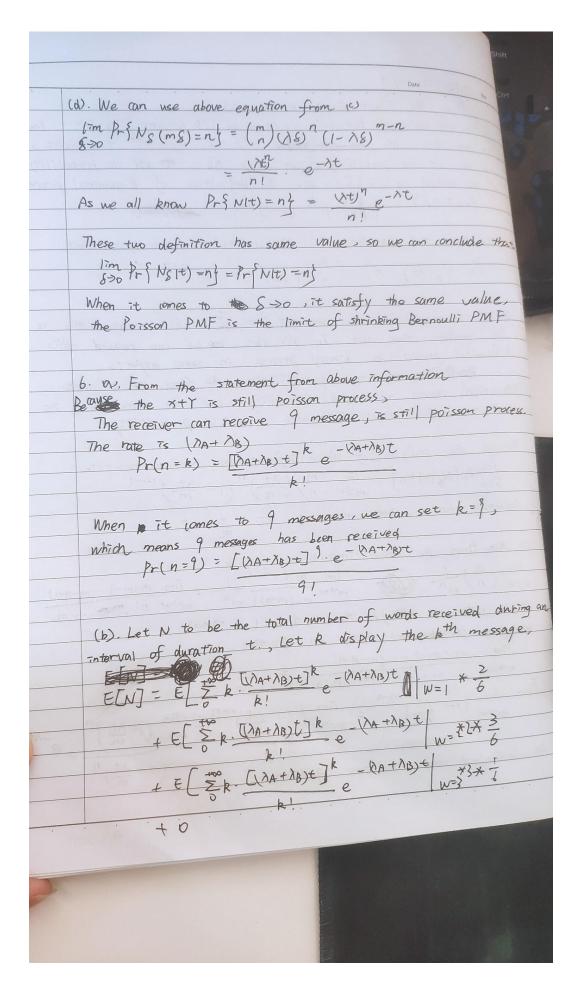


4. EXERCISE 2.7 (A) For FOIT) = Pr[NIT) = 04 Using the hint $\left(\frac{dftv}{dt}\right) = \left(\frac{1}{5} t + 8\right) - f(t)$ We can Folt) = Pr SN(t) = of = 1= 15 FO(1) To 12+8) = Pr{ N(30 2+8)=0} = 1 1(16) + 10(6) d Fo It) - lim Fo (It+d) - Fo(I) - lim Pr (NI tts)=) - Pr (NII)=0) dt 6>0 d8 8>0

- lim Pr[N(t)=0] [Af N(t, t+6) =0] - 10 |
8>0 This is based on the counting process is memoless And then we change this form, we can get Pr { N(t, t+s)=0} = 1-18+0(s) Let put this equation into above expression = Tim Pr{N(t) =0} 1-76+0(5)-1 = -1) Pr {N(t)=0} In conclusion, we can get $\frac{dF_0(\tau)}{d\tau} = -\lambda F_0(\tau)$ (b) For XI (the first arrival), which means I (1) when t = time of first arrival, itstill satisfy the condition in low dFo (T) = - A Fo (T) dt dFolt) = - > dt Folt) And then we use the definition of dedifferental equation Info (c) = - AI+C When we focus on T=0, FOIT) = , put this restrictions this equation, we can find C=0. So $F_0(T)=e$ To sun up, X, is exponential with pareameter). Besform







As for the expected number of counting process, we can use As for the end of the idea from Q_2 So $E\left[\frac{700}{5}k \cdot \frac{\left(\sqrt{\lambda_1 + \lambda_1}k\right)^2}{k!} e^{-\left(\lambda_1 + \lambda_1 k\right)^2}\right] = \left(\lambda_1 + \lambda_1 k\right)^2$ To sum up, the total result is 11 (MA+MB) t (c). As for the above information, we only need pay attention to three-word message, other not other topes We can regard their these two transmitter A and B only send 3 - word message, under the condition (to propabability) When it comes to the receiver, the rate became $\frac{3A+3B}{6}$ Pr $\left\{\begin{array}{c} \frac{1}{2} + \frac{1}$ Let k=8, we can get $Pr\{x\} = \begin{cases} \frac{\lambda_A + \lambda_B}{6} \end{cases} = \frac{\lambda_A + \lambda_B}{6}$ $\frac{\lambda_A + \lambda_B}{6} = \frac{\lambda_A + \lambda_B}{6}$ (d) When it comes to exactly 8 out of the 12 messages. we can conclude this is & Binominal process in some aspects. ith nom message from transmitter A, with P = MA may from transmitter B, with 1-p = A+AB. Obviously, Prom & messages from A out of 12 messages of the same of 12 messages of 12 message = (8) (AA+AB) 12 Besform