Matlab a) Because N is the number of trials with a failure with a fixed probability of failure, we can calculate the probability of N=n by (1-p)^{-1}(p) Because we require that n-1 trials ead in sween (probability (1-p)^{n-1}) and then that the system fails on the next trial (probability p). Therefore P(N=n)=(1-p)^{n-1}(p) b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a poisson process with cate Ap. So the northing time for the failure of the system as a poisson process with cate Ap. So the northing time for the failure of the system as a poisson process with cate Ap. So the northing time for the failure of the system as a poisson process and failures we can model the failure of the system as a poisson process and failures. P(T=t) = P(T=t) = P(T=t) = P(T=t) = P(T=t) = Ape for the known P(N=n)=(1-p)^{n-1}(p), P(T=t)=Ape for the northing time for the northeast Theopher (P(T=t)N=n)= (n-1)! Anti-1-At (1-p)^{n-1} p = Ape for (n-1)! d) As discussed in part (a), P(T=t)N=n)= (n-1)! E[T]N=10] = So t P(T=t)N=10 dt = So (n-1)!	A) Because N is the number of trials with a failure with a fixed probability of failure, we can calculate the probability of N=n by (1-p)"(p) Because we require that n-1 trial end in sweeze (probability (1-p)") and then that the system fails on the next trial (probability p). Therefore P(N=n) = (1-p)"(p) b) By splitting the poisson process into a process for successes and failures with can model the failure of the system as a poerson process with cate Ap. So the nating time for the historical trial has process of T ~ Exp (Ap) >> P(T=t) = e C) P(N=n T=t) = P(T=c N=n)P(N=n) We know P(N=n)=(1-p)"(p), P(T=t)=Ape the also trave that ITN=n) ~ Gamma(n, 1) because this is the warting time for the nil event Theopies [P(T=t N=n) = \frac{1}{(n-1)!} Ap(=App)(n=1)! d) As discussed in part (i), P(T=t N=n) = \frac{1}{(n-1)!} Then is a failure from Problem 1 is 2 0077 . FIT N= io) = \frac{1}{2} \tau P(T=t N=10) \text{ dt} = \frac{2}{2} which is very close to appear to the office of the size	A
a) Because N is the number of trials (while a facture with a fixed probability of failure, we can calculate the probability of N=n by (1-p) ⁿ⁻¹ (p) Because we require that n=1 trial end in success (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n)=(1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and fadines we can model the failure of the system as a poisson process with cate up. So the narrow time for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process and fadines. P(T=t)=e P(N=n)T=t)= P(T=t)=e The failure of the system of the system as a poisson process and fadines. In the system process and fadines. P(T=t)=e The failure of the system o	a) Because N is the number of trials with a failure with a fixed probability of failure, we can calculate the probability of N=n by (1-p) ⁿ⁻¹ (p) Because we require that n-1 trial end in sweeces (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n) = (1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a poisson process with rate up. So the nating time for the first event to the process is Tr Exp (Ap) -> P(T=t)=e c) P(N=n T=t) = P(T=t N=n)P(N=n) P(T=t) = P(T=t) = Ape to the failure of the first event to the process is Tr Exp (Ap) -> P(T=t)=e c) P(N=n T=t) = P(T=t N=n)P(N=n) For the non-event Therefore (P(T=t N=n)= \frac{\lambda perme-\lambda t}{(n-1)!} The non-event Therefore (P(T=t N=n)= \frac{\lambda perme-\lambda t}{(n-1)!} d) As discussed in part (a), P(T=t N=n)= \frac{\lambda n t n-2}{(n-1)!} E[T N=n) = \frac{\lambda pert (a)}{\lambda perme proteon 1 is 2 oot 1 \text{ in the event to the process is 2 on 1 \text{ in the event to 1} \text{ the point of the event to 2} \text{ the point of the point of the event to 2} the point of the p	ACMILO Set 6
a) Because N is the number of trials (while a facture with a fixed probability of failure, we can calculate the probability of N=n by (1-p) ⁿ⁻¹ (p) Because we require that n=1 trial end in success (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n)=(1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and fadines we can model the failure of the system as a poisson process with cate up. So the narrow time for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process with cate up. So the narrow fine for the failure of the system as a poisson process and fadines. P(T=t)=e P(N=n)T=t)= P(T=t)=e The failure of the system of the system as a poisson process and fadines. In the system process and fadines. P(T=t)=e The failure of the system o	a) Because N is the number of trials with a failure with a fixed probability of failure, we can calculate the probability of N=n by (1-p) ⁿ⁻¹ (p) Because we require that n-1 trial end in sweeces (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n) = (1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a poisson process with rate up. So the nating time for the first event to the process is Tr Exp (Ap) -> P(T=t)=e c) P(N=n T=t) = P(T=t N=n)P(N=n) P(T=t) = P(T=t) = Ape to the failure of the first event to the process is Tr Exp (Ap) -> P(T=t)=e c) P(N=n T=t) = P(T=t N=n)P(N=n) For the non-event Therefore (P(T=t N=n)= \frac{\lambda perme-\lambda t}{(n-1)!} The non-event Therefore (P(T=t N=n)= \frac{\lambda perme-\lambda t}{(n-1)!} d) As discussed in part (a), P(T=t N=n)= \frac{\lambda n t n-2}{(n-1)!} E[T N=n) = \frac{\lambda pert (a)}{\lambda perme proteon 1 is 2 oot 1 \text{ in the event to the process is 2 on 1 \text{ in the event to 1} \text{ the point of the event to 2} \text{ the point of the point of the event to 2} the point of the p	1 14-11-1
of failure, we can calculate the probability of N=n by (1-p) ⁿ⁻¹ (p) Because we require that n-1 trick ead in success (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n)=(1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a power process with rate Ap. So the naiting time for the frict event for the process of Tree Exp (Ap) -> P(T=t)-e P(T=t) = P(T=t) = P(T=t) -> P(T=t) = Ape Apt We know P(N=n)=(1-p) ⁿ⁻¹ (p), P(T=t)=Ape Apt We also know that [T N=n] regarded from the warting time for the nto event Therefore [P(T=t N=n)=\frac{1}{(n-1)!} > P(N=n T=t) = \frac{1}{Ap(e-App)(n-1)!} = \frac{1}{(n-1)!} Ap(e-App)(n-1)! d) As discussed in pact (a), P(T=t N=n) = \frac{1}{(n-1)!} a) Our extracted value from Provent is 2 00741 in the F[T] N=10 = \frac{5}{2} t P(T=t N=10) dt = \frac{5}{2} \frac{1}{2} t V V V V V V V V V V V V V V V V V V	effailure, we can calculate the probability of N=N by (1-p)^{(1)}(p) Because we require that n-1 trade end in success (probability (1-p)^{(1)}) and then that the system fails on the next trial (probability p). Therefore $P(N=n) = (1-p)^{n-1}(p)$ (b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a poisson process with cate Ap. So this northing time for the first event for the process is $T \sim Exp(Ap) \rightarrow P(T=t) = e$ (c) $P(N=n T=t) = P(T=t N=n)P(N=n)$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = Ape^{-Apt}$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t N=n) = Ape^{-Apt}$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t N=n) = Ape^{-Apt}$ We have the not event Theoper $P(T=t N=n) = Ape^{-Apt}$ (n-1)! P(N=n T=t) = $Ap(e^{-App})(n=1)!$ (n-1)! (1-p)^{n-1} App(e^{-App})(n=1)! (n-1)! (n-1)! (n-1)! (1-p)^{n-1} App(e^{-App})(n=1)! (n-1)! (1-p)^{n-1} App(e^{-App})(n=1)! (1-p	FICTION
of failure, we can calculate the probability of N=n by (1-p) ⁿ⁻¹ (p) Because we require that n-1 trick ead in success (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n)=(1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a power process with rate Ap. So the naiting time for the frict event for the process of Tree Exp (Ap) -> P(T=t)-e P(T=t) = P(T=t) = P(T=t) -> P(T=t) = Ape Apt We know P(N=n)=(1-p) ⁿ⁻¹ (p), P(T=t)=Ape Apt We also know that [T N=n] regarded from the warting time for the nto event Therefore [P(T=t N=n)=\frac{1}{(n-1)!} > P(N=n T=t) = \frac{1}{Ap(e-App)(n-1)!} = \frac{1}{(n-1)!} Ap(e-App)(n-1)! d) As discussed in pact (a), P(T=t N=n) = \frac{1}{(n-1)!} a) Our extracted value from Provent is 2 00741 in the F[T] N=10 = \frac{5}{2} t P(T=t N=10) dt = \frac{5}{2} \frac{1}{2} t V V V V V V V V V V V V V V V V V V	effailure, we can calculate the probability of N=N by (1-p)^{(1)}(p) Because we require that n-1 trade end in success (probability (1-p)^{(1)}) and then that the system fails on the next trial (probability p). Therefore $P(N=n) = (1-p)^{n-1}(p)$ (b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a poisson process with cate Ap. So this northing time for the first event for the process is $T \sim Exp(Ap) \rightarrow P(T=t) = e$ (c) $P(N=n T=t) = P(T=t N=n)P(N=n)$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = Ape^{-Apt}$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t N=n) = Ape^{-Apt}$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t N=n) = Ape^{-Apt}$ We have the not event Theoper $P(T=t N=n) = Ape^{-Apt}$ (n-1)! P(N=n T=t) = $Ap(e^{-App})(n=1)!$ (n-1)! (1-p)^{n-1} App(e^{-App})(n=1)! (n-1)! (n-1)! (n-1)! (1-p)^{n-1} App(e^{-App})(n=1)! (n-1)! (1-p)^{n-1} App(e^{-App})(n=1)! (1-p	2. a) Because N is the number of trials until a failure with a fixed probability
Because we require that n-I trib ead in success (probability (1-p)^n-1) and then that the system fails on the next trial (probability p). Therefore $P(N=n) = (1-p)^{n-1}(p)$ b) By splitting the poisson process into a process for successes and failures we can model the failure of the first event for the process is $T \sim \exp(\lambda p) \rightarrow P(T=t) = e$ c) $P(N=n T=t) = P(T=t N=n)P(N=n)$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = \lambda pe^{-\lambda pt}$ We know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the non-event Theofore $[P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{\lambda^n t^{n-1}e^{-\lambda t}} = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ d) As discussed in part (a), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ d) As discussed in part (a), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ The solution of the proposant is $T = 0.079$ and $T = 0.079$. E[T N= N = $\int_0^\infty t P(T=t N=0) dt = \int_0^\infty \int_0^\infty t^n t^{n-1}e^{-\lambda t} dt$ $= \int_0^\infty \int_0^\infty t^n t^{n-1}e^{-\lambda t} dt = 2$ which is very close to	Because we require that n=1 trible and in success (probability (1-p) ⁿ⁻¹) and then that the system fails on the next trial (probability p). Therefore P(N=n) = (1-p) ⁿ⁻¹ (p) b) By splitting the poisson process into a process for successes and failures we can model the failure of the system as a poisson process with rate up. So the norting time for the first event for the process of T exp (up) -> P(T=t) - e C) P(N=n T=t) = P(T=t N=n)P(N=n) We know P(N=n)=(1-p) ⁿ⁻¹ (p), P(T=t) = up= We know P(N=n)=(1-p) ⁿ⁻¹ (p), P(T=t)=1 = up= We know that [T N=n] ~ Gamma(n, 1) became this is the warting time for the not event Theopere [P(T=t N=n)= \frac{(n-1)!}{(n-1)!} P(N=n T=t) = \frac{1}{\text{p}(e^{-\text{sp}})(n=1)!} \frac{1}{\text{p}(e^{-\text{sp}})(e^{-\text	
then that the system fails on the next trial (probability p). Therefore $P(N=n) = (1-p)^{n-1}(p)$ b) By splitting the poisson process into a process for successes and fadines we can model the failure of the system as a poisson process with rate up. So the natural time for the first event to the process is $T \sim Exp(\lambda p) \rightarrow P(T=t) = e$ c) $P(N=n T=t) = P(T=t N=n)P(N=n)$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = \lambda pe^{-\lambda pt}$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = \lambda pe^{-\lambda pt}$ We also trian that $P(N=n) = P(T=t N=n) = P$	Therefore $P(N=n) = (1-p)^{n-1}(p)$ b) By splitting the poissen process into a process for successes and failures we can model the failure of the system as a poissen process with cate λp . So the northern time for the failure of the system as a poissen process with cate λp . So the northern time for the failure of the process $T \sim \exp(\lambda p) \rightarrow P(T=t) - e$ c) $P(N=n T=t) = P(T=t N=n)P(N=n)$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t) = \lambda p = \lambda p = \lambda p$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t) = \lambda p = \lambda p = \lambda p$ We also throw that $[T N=n] \sim Gamma(n, \lambda)$ because this is the warting time for the n -th event Theories $[P(T=t N=n) = \lambda p = $	· · · · · · · · · · · · · · · · · · ·
Therefore $P(N=n) = (1-p)^{n-1}(p)$ b) By splitting the poisson process into a process for successes and fadines we can model the failure of the system as a poisson process with cate up. So the natural time for the first event for the process of $T \sim Exp(\lambda p) \rightarrow P(T=t) = e$ c) $P(N=n T=t) = P(T=t N=n)P(N=n)$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = \lambda pe^{-\lambda pt}$ We also trace that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the n^{4n} event. Therefore $[P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda^n (e^{-\lambda t}p)} = \frac{(1-p)^{n-1}e^{-\lambda t}}{(n-1)!}$ d) As discussed in part (c), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ d) As discussed in part (c), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ E[T N=10] = $\int_0^\infty t P(T=t N=0) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-1)!} dt$ $= \int_0^\infty \frac{t^{n-1}e^{-\lambda t}}{q!} dt = \frac{t^{n-1}e^{-\lambda t}}{q!} \int_0^\infty t^{n-1}e^{-\lambda t} dt = 2$ which is very close to	Therefore $P(N=n) = (1-p)^{n-1}(p)$ b) By splitting the poisson process into a process for successes and failures We can model the failure of the system as a poisson process with rate up. So the narting time for the first event by the process $T \sim \exp(\lambda p) \rightarrow P(T=t) = e$ c) $P(N=n T=t) = P(T=t N=n) P(N=n)$ We know $P(N=n) = (1-p)^{n-1}(p)$, $P(T=t) = \lambda pe^{-\lambda pt}$ We also trave that $[T N=n] \sim Gamma(n,\lambda)$ because this is the warting time for the nth event. Therefore $[P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}]$ P $[N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{\lambda^n (n-1)!} = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ c) As discussed in part (c), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ Therefore $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$	Because we require that n-I trails end in success (probability (1-p) n-1) and
b) By splitting the poisson process into a process for successes and fadines we can model the failure of the system as a poisson process with cate \(\frac{1}{4} \). So the nating time for the frist event for the process is $T \sim \exp(\lambda p) \rightarrow P(T=t) = e$ C) $P(N=n T=t) = P(T=t)$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ because this is the warring time for the not event. Therefore $P(T=t N=n) = \frac{(n-1)!}{(n-1)!}$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{\lambda^n (e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}e^{-\lambda t}}{(n-1)!}$ a) Our exhaused in part (i), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ E[T N=10] = $\int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n t}{(n-1)!} dt$ $P(T=t N=10) = \int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n t}{(n-1)!} dt$ $P(T=t N=10) = \int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n t}{(n-1)!} dt$	b) By splitting the poisson process into a process for successes and fadines we can model the failure of the system as a poisson process with cate Ap. So the narting time for the first event for this process is $T \sim Exp(\lambda p) \rightarrow P(T=t)=e$ $P(T=t) = P(T=t) = P(T=t)$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We know that $[T \mid N=n] \sim Gamma(n,\lambda)$ because this is the warting time for the none event Theopher $P(T=t \mid N=n)=\frac{\lambda^n e^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(N=n \mid T=t) = \frac{\lambda^n e^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda P(e^{-\lambda t}p)(n-1)!} = \frac{\lambda^n e^{n-1}e^{-\lambda t}}{(n-1)!}$ (1-p) $\frac{\lambda^n e^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{(n-1)!}$ (2) Our exhausted value from Problem 1 is 2 0071. If $\frac{\lambda^n e^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(T=t \mid N=t0) = \sum_{n=1}^{\infty} \frac{\lambda^n e^{n-1}e^{-\lambda t}}{(n-1)!}$ (n-1)! ELT $ N=t0 = \sum_{n=1}^{\infty} \frac{\lambda^n e^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(T=t \mid N=t0) = \sum_{n=1}^{\infty} \frac{\lambda^n e^{n-1}e^{-\lambda t}}{(n-1)!}$	then that the system fails on the next trial (probability p).
we can model the failures of the system as a poisson process with cate Ap. So the narting time for the first event for the process is $T \sim Exp(\lambda p) \rightarrow P(T=t)=e$ C) $P(N=n T=t)=P(T=t N=n)P(N=n)$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We know that $[T N=n] \sim Gamma(n, \lambda)$ because this is the warting time for the nth event. Therefore $(P(T=t N=n)=\frac{\lambda^n e^{n-t}e^{-\lambda t}}{(n-1)!}$ $P(N=n T=t)=\frac{\lambda^n e^{n-t}e^{-\lambda t}}{\lambda p(e^{-\lambda t}p)(n-t)!}=\frac{(1-p)^{n-1}\lambda^{n-1}e^{-\lambda t}}{(n-1)!}$ d) As discussed in part (c), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ a) Our extended value from Problem 1 is $1 = 0$ of $1 = 0$ in $1 = 0$ the $1 = 0$ of $1 = 0$ in $1 = 0$ the $1 = 0$ of $1 = 0$ in $1 = 0$ the $1 = 0$ of $1 = 0$ in $1 = 0$ of $1 = 0$ in $1 = 0$ in $1 = 0$ of $1 = 0$ in $1 =$	we can model the failure of the system as a poisson process with cate up. So the nailing time for the frist event for the process is $T \sim Exp(\lambda p) \rightarrow P(T=t)=e$ C) $P(N=n T=t)=P(T=t)$ We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ because this is the warting time for the not event. Therefore $[P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ P(N=n T=t)= $\frac{\lambda^n t^{n-1}e^{-\lambda t}}{\lambda p(e^{-\lambda t}p)(n-1)!}$ Therefore $\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ Therefore $$	
We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the nth event. Therefore $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(N=n T=t)=\frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda p(e^{-\lambda t}p)(n-1)!}=\frac{(1-p)^{n-1}\lambda^{n-1}t^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ d) As discussed in part (c), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$	We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the n th event Theofere $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ P(N=n T=t) = $\frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda^n (e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}\lambda^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ d) As discussed in part (i), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ E[T N=10] = $\int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-1)!} dt$ = $\int_0^\infty \frac{t^n t^n e^{-\lambda t}}{q!} dt = \frac{t^n t^n e^{-\lambda t}}{q!} \int_0^\infty t^n e^{-\lambda t} dt = 2$ which is very close to	b) By splitting the poisson process into a process for successes and failures
We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the nth event. Therefore $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(N=n T=t)=\frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda p(e^{-\lambda t}p)(n-1)!}=\frac{(1-p)^{n-1}\lambda^{n-1}t^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ d) As discussed in part (c), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$	We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the n th event Theofere $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ P(N=n T=t) = $\frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda^n (e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}\lambda^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ d) As discussed in part (i), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ E[T N=10] = $\int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-1)!} dt$ = $\int_0^\infty \frac{t^n t^n e^{-\lambda t}}{q!} dt = \frac{t^n t^n e^{-\lambda t}}{q!} \int_0^\infty t^n e^{-\lambda t} dt = 2$ which is very close to	we can model the failures of the system as a poisson process with rate Ap.
We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the nth event. Therefore $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ $P(N=n T=t)=\frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda p(e^{-\lambda t}p)(n-1)!}=\frac{(1-p)^{n-1}\lambda^{n-1}t^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ d) As discussed in part (c), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$	We know $P(N=n)=(1-p)^{n-1}(p)$, $P(T=t)=\lambda pe^{-\lambda pt}$ We also know that $[T N=n] \sim Gamma(n,\lambda)$ became this is the warting time for the n th event Theofere $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ P(N=n T=t) = $\frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda^n (e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}\lambda^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ d) As discussed in part (i), $P(T=t N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ E[T N=10] = $\int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-1)!} dt$ = $\int_0^\infty \frac{t^n t^n e^{-\lambda t}}{q!} dt = \frac{t^n t^n e^{-\lambda t}}{q!} \int_0^\infty t^n e^{-\lambda t} dt = 2$ which is very close to	So the naiting time for the first event by the process is T~ Exp (Ap) -> . P(T=t)= P(T=t N=n) P(N=n)
We also know that $[T N=n] \sim Gamma(n, \lambda)$ because this is the warting time for the nth event. Therefore $[P(T=1 N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}]$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda P(e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1} + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$	We also know that $[T N=n] \sim Gamma(n, \lambda)$ because this is the warting time for the nth event. Therefore $[P(T=1 N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}]$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda P(e^{-\lambda t}p)(n-1)!} = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ (n-1)! d) As discussed in part (i), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$	
We also know that $[T N=n] \sim Gamma(n, \lambda)$ because this is the warting time for the nth event. Therefore $[P(T=1 N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}]$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda P(e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1} + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$	We also know that $[T N=n] \sim Gamma(n, \lambda)$ because this is the warting time for the nth event. Therefore $[P(T=1 N=n)=\frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}]$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda P(e^{-\lambda t}p)(n-1)!} = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ (n-1)! d) As discussed in part (i), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$	We know P(N=n)=(1-b) (n) P(T=+)= loe-lpt
for the nth event. Theofore $[P(T=1 N=n)=\frac{1^n t^{n-1}e^{-\lambda t}}{(n-1)!}]$ $P(N=n T=t) = \frac{\lambda^n t^{n-1}e^{-\lambda t}(1-p)^{n-1}(p)}{\lambda^n p(e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}e^{-\lambda t}}{(n-1)!}$ d) As discussed in part (a), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-1)!}$ 2) Our eshmoded value from Problem 1 is $2 \cdot 0079$. $E[T N=10] = \int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-1)!} dt$ $= \int_0^\infty \frac{5^{10}t^{10}e^{-5t}}{9!} dt = \frac{5^{10}}{9!} \int_0^\infty t^{10}e^{-5t} dt = 2$ which is very close to	for the nth event. Theofire $[P(T=t N=n)=\frac{1}{(n-1)!}]$ $P(N=n T=t) = \frac{1}{\lambda P(e^{-\lambda t}P)(n-1)!} = \frac{(1-p)^{n-1}}{(1-p)^{n-1}} \frac{1}{\lambda P(e^{-\lambda t}P)(n-1)!} = \frac{(1-p)^{n-1}}{(n-1)!} \frac{1}{\lambda P(e^{-\lambda t}P)(n-1)!}$ d) As discussed in part (c), $P(T=t N=n)=\frac{1}{(n-1)!} \frac{1}{(n-1)!}$ 2) Our exhanded value from Problem 1 is 2 on 79. $E[T N=k0] = \int_{0}^{\infty} t P(T=t N=10) dt = \int_{0}^{\infty} \frac{1}{(n-1)!} dt$ $= \int_{0}^{\infty} \frac{1}{q!} \frac{1}{q!} \int_{0}^{\infty} t^{10} e^{-3t} dt = 2 \text{which is very close to}$	We also know that [TIN=n] ~ Gamma (n, 1) brecause this is the warting time
$P(N:n T=t) = \frac{\lambda^{n+n}e^{-\lambda t}(1-p)^{n}(p)}{\lambda^{n}(e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}}{\lambda^{n}(e^{-\lambda t}p)(n-1)!}$ $d) \text{ As discussed in part } (0), P(T=t N=n) = \frac{\lambda^{n+n-1}e^{-\lambda t}}{(n-1)!}$ $e) \text{ Our estimated value from Problem 1 is 2.0079} . F[T N=k0] = \int_{0}^{\infty} t P(T=t N=10) dt = \int_{0}^{\infty} \frac{\lambda^{n}t^{n}e^{-\lambda t}}{(n-1)!} dt = \int_{0}^{\infty} \frac{s^{10}t^{10}e^{-\delta t}}{q!} dt = \frac{s^{10}}{q!} \int_{0}^{\infty} t^{10}e^{-\delta t} dt = 2 \text{ which is very close to the problem 1}$	$P(N:n T=t) = \frac{\lambda^{n+1}e^{-\lambda t}(1-p)^{n}(p)}{\lambda^{n}(e^{-\lambda t}p)(n-1)!} = \frac{(1-p)^{n-1}\lambda^{n-1}e^{-\lambda t}(1-p)}{(n-1)!}$ $d) \text{ As discussed in part (a), } P(T=t N=n) = \frac{\lambda^{n+1}e^{-\lambda t}}{(n-1)!}$ $e) \text{ Our eshmoded value from Problem 1 is 2 0079} . If the element 1 is 2 0079 is the element 1 i$	for the nth event. Theopie (P(T=+ N=n)= Intn-e-lt
$P(N=n T=t) = \frac{1}{\lambda P(e^{-\lambda t}P)(n-1)!}$ $AP(e^{-\lambda t}P)(n-1)!$ $AP(e^{-\lambda t}P)(e^{-\lambda t}$	$P(N:n T=t) = \frac{\lambda P(e^{-\lambda t}P)(n-1)!}{\lambda P(e^{-\lambda t}P)(n-1)!}$ $d) \text{ As discussed in part } (0), P(T=t N=n) = \frac{\lambda^{n+n-1}e^{-\lambda t}}{(n-n)!}$ $e) \text{ Our exhimated value from Problem 1 is 2.0079} . If the element is 2.0079 is the element of the elem$	1 (n-1)!
d) As discussed in part (i), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-n)!}$ a) Our estimated value from Problem 1 is $2 \cdot 0079$. $F[T N=10] = \int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-n)!} dt$ $= \int_0^\infty \frac{s^{10} t^{10}e^{-\delta t}}{9!} dt = \frac{s^{10}}{9!} \int_0^\infty t^{10}e^{-\delta t} dt = 2 which is very close to the standard of the standard of$	d) As discussed in part (i), $P(T=t N=n) = \frac{\lambda^n t^{n-1}e^{-\lambda t}}{(n-n)!}$ 2) Our exhausted value from Problem 1 is 2.0079 . $F[T N=10] = \int_0^\infty t P(T=t N=10) dt = \int_0^\infty \frac{\lambda^n t^n e^{-\lambda t}}{(n-n)!} dt$ $= \int_0^\infty \frac{s^{10} t^{10} e^{-5t}}{9!} dt = \frac{s^{10}}{9!} \int_0^\infty t^{10} e^{-5t} dt = 2$ which is very close to	> IP(N:n T=t) = 10(-16)1
©) Our estimated value from Problem 1 is 2.0079 . [F[T N=10] = $\int_{0}^{\infty} t P(T=t N=10) dt = \int_{0}^{\infty} \frac{x^{n} t^{n} e^{-t} t}{(n=1)!} dt$ = $\int_{0}^{\infty} \frac{s^{10} t^{10} e^{-5t}}{9!} dt = \frac{s^{10}}{9!} \int_{0}^{\infty} t^{10} e^{-5t} dt = 2$ which is very close to	2) Our exhauted value from Problem 1 is 7.0079 . [E[T N=10] = $\int_{0}^{\infty} t P(T=t N=10) dt = \int_{0}^{\infty} \frac{x^{n} t^{n} e^{-t}}{(n-1)!} dt$ = $\int_{0}^{\infty} \frac{5^{10} t^{10} e^{-5t}}{9!} dt = \frac{5^{10}}{9!} \int_{0}^{\infty} t^{10} e^{-5t} dt = 2$ which is very close to	
= $\int_{0}^{\infty} \frac{s^{10} t^{10} - 5t}{9!} dt = \frac{s^{10}}{9!} \int_{0}^{\infty} t^{10} e^{-st} dt = 2$ which is very close to	= $\int_{0}^{\infty} \frac{5^{10} t^{10} e^{-5t}}{9!} dt = \frac{5^{10}}{9!} \int_{0}^{\infty} t^{10} e^{-5t} dt = 2$ which is very close to	d) As discussed in part (c), P(T=t N=n) = (n-1)!
= $\int_{0}^{\infty} \frac{s^{10} t^{10} - 5t}{9!} dt = \frac{s^{10}}{9!} \int_{0}^{\infty} t^{10} e^{-st} dt = 2$ which is very close to	= $\int_{0}^{\infty} \frac{5^{10} t^{10} e^{-5t}}{9!} dt = \frac{5^{10}}{9!} \int_{0}^{\infty} t^{10} e^{-5t} dt = 2$ which is very close to	a) Our estimated value from Problem 1 is 2.0079.
		= (00 510 tio -5t dt = 510 (00 + 10 -5t dt - 2)
gu es muse y ane of 2,001 (.	our estimates yaure of 2,00 ().	
		our estimates value of 2,0011.

```
Acmile Set 6
3. a) We know B== B=+ X, X~N(0, t2-t1)
    \rightarrow B_{t_1} + B_{t_1} = 2B_{t_1} + X
      And because Bt, ~ N(0,t1), and Bt, ILX, and 2Bt, ~ N(0,4t1)
      73+ X ~ N (0, 3+3++2)
       Therefore P(B_{4,1}B_{4,2}>a)=P(2B_{4,1}+X>a)=P(2>\sqrt{34_{2}+k_{2}})=[1-\overline{\Phi}(\frac{a}{\sqrt{34_{2}+k_{2}}})]
    b) E[X_1] = \int_{-\infty}^{\infty} e^{X} \left(\frac{1}{\sqrt{2\pi}}\right) e^{-\frac{X^2}{2}} dx = \sqrt{e} by Wolfram Alpha

c) V[X_1] = [E[X_1^2] - E[X_1]^2 = \int_{-\infty}^{\infty} e^{2X} \left(\frac{1}{\sqrt{2\pi}}\right) e^{-\frac{X^2}{2}} dx - e = [e^2 - e] by Wolfram Alpha
fram bettom of slide \neq q

4 a) P(T_a < \infty) = 2(1-\frac{\pi}{2}) = 2(1/2) = 1
       b) We note that:
                 P(T_{a}=t) = P(B_{t}=a)(1-P(T_{a} < t))^{2}
= \frac{1}{\sqrt{10t}} \exp\left[-\frac{a^{2}}{2t}\right][1-2(1-\delta(\frac{ta}{t}))]
                                 = \frac{e^{\left[-\alpha \frac{\gamma_{24}}{\gamma_{211}}\right]}}{\sqrt{2\pi \epsilon}} \left[1-2+2\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{14\sqrt{\epsilon}} e^{-\frac{t^{2}}{2}} dt\right]
             = \frac{e^{\left[-\alpha^{2}/2t\right)}}{\sqrt{2\pi t}} \left[ erf\left[\frac{|a|}{\sqrt{2t}}\right] - \frac{\alpha^{2}/2t}{\sqrt{2\pi t}} \right]
So E[T_{a}] = \int_{0}^{\infty} P(T_{a} = t) t dt = \int_{0}^{\infty} \frac{te}{\sqrt{2\pi t}} erf
        This integral does not converge, so we conclude that [F[T_1]:00
5. Matlab
```

```
M = 1e5;
lambda = 5;
p = 0.1;
critfail = 10;
failtimes = 0;
validfailures = 0;
for a = 1:M
    timewaited = 0;
    failroll = 1;
    count = 0;
    while failroll > 0.1
        timewaited = timewaited + exprnd(1/lambda);
        failroll = rand();
        count = count + 1;
        if count > critfail
           break;
        end
    end
    if count == critfail
       validfailures = validfailures + 1;
       failtimes = failtimes + timewaited;
    end
end
avgfailtime = failtimes./validfailures;
disp('Average waiting time for failure given that the system fails on
the 10th shock: ');
disp(avgfailtime);
Average waiting time for failure given that the system fails on the
 10th shock:
    2.0079
```

Published with MATLAB® R2018a

```
N = 1000;
T = 10;
delT = 0.01;
n = T/delT_i
exceedct = 0;
for a = 1:N
    Zs = normrnd(0,1,n,1);
    A = sqrt(delT).*tril(ones(n,n));
    walk = A*Zs;
    maxval = max(walk);
    if maxval >= 4
       exceedct = exceedct + 1;
    end
end
disp('Proportion Brownian motion exceeded 4:');
disp(exceedct/N);
disp('Theoretical value: ');
disp(2*(1 - normcdf(4/sqrt(10))));
disp('We can see that the estimated and theoretical values are quite
close to each other.');
Proportion Brownian motion exceeded 4:
    0.1990
Theoretical value:
    0.2059
We can see that the estimated and theoretical values are quite close
 to each other.
```

Published with MATLAB® R2018a