Quiz 5&6 2016.06.01 20 points each

1. $X \sim$ **geometric**(0.5). Apply Chebyshev inequality to bound $\mathbf{P}(X \geq 3)$.
2. $Y \sim$ **exponential**(2). Apply Markov inequality to bound $\mathbf{P}(Y \geq 2)$.
3. The processing times of parts by a machine are i–i–d Gaussian random variables with mean 3 and variance 2. Apply the central limit theorem to approximate $\mathbf{P}(N_{320} \geq 100)$.
4. Bill gets e-mails according to a Poisson process at a rate of $\lambda = 0.5$ messages per hour. He checks email every 2 hours. What is the probability of finding 0 and 1 new messages?
5. Priority jobs arrive in a slot with probability 0.3. What is the PMF of the length of the first idle period?
6. Let Y_i be the ith arrival time of a Bernoulli process with arrival probability 0.2. Compute $\mathbf{P}(Y_4 = 6)$.
7. Gary Kasparov plays against 50 amateurs in a large simultaneous exhibition. It has been estimated from past experience that Kasparov wins in such exhibitions 98% of his games on average. What are the probabilities that he will win 48 games or more?
8. You and your partner go to a badminton court. There is already one group waiting. Assume that the playing time of a group has an exponential PDF with parameter λ. What is the PDF of your waiting time?