**1)** Documents are sent to a printer according to a Binomial process with 3-second frames, at the rate of 2 jobs per minute. Find

**a) (1 point)** the probability of more than 35 jobs sent to the printer during 15 minutes;

**b) (1 point)** the expected number of jobs sent to the printer during a 1-hour period.

**2)** An encrypting program generates sequences of letters, such that a vowel is followed by a consonant with probability 0.3, while a consonant is followed by a vowel with probability 0.4. Suppose that the first character is a consonant with probability 0.8. Find

**a) (1.5 points)** the probability of the third character being a vowel;

**b) (1.5 points)** the probability of the $100^{\text{th}}$ character on the $50^{\text{th}}$ page being either a vowel or a consonant.

**3) (2 points)** Two customer representatives are helping clients at a firm. Their service times are Exponential with parameters $\lambda = 5$ hrs$^{-1}$ and $\lambda = 20$ hrs$^{-1}$, respectively. Since the second representative works 4 times faster, the probability of a new client being helped by her is 4/5. Let $X$ be the service time for the new client. Explain how to generate the random variable $X$.

**4)** Jobs arrive at a service facility according to a Poisson process at the rate of 2 every 10 minutes. Service times are Exponential, the average service taking 4 minutes. Compute

**a) (1 point)** the average number of jobs in the system and the average number of jobs waiting in a queue;

**b) (1 point)** the fraction of time when the facility is busy servicing a job and at least five other jobs are waiting in a queue.