(1). Diagnoses that a patient needs renal dialysis occur at random at a more or less constant rate throughout the year.

(a) Ignoring complications about weekends and holidays, what distribution would you expect the number of patients, $R$, needing renal dialysis on a randomly selected day, to follow?

(b) If $\mu$ is the mean rate of occurrence per day, write down the form of the probability distribution of $R$.

(c) Show that
\[
P(R = r + 1) = \frac{\mu}{r + 1}.
\]

(d) A hospital has three kidney machines, each of which can only be used by one patient per day. If $\mu = 2$, calculate the probability that (i) no kidney machine will be needed on a given day; (ii) some patients cannot be dialysed on a given day; (iii) there will be exactly one day in a seven-day period when some patients cannot be dialysed.

(2). From the Book: 3.37, 3.38, 3.39, 3.46, 4.1ab