

Solution for exercise 33, exercise 2 final exam 25/5-2000

Question 1

$$F(t) = 1 - pe^{-\gamma_1 t} - (1-p)e^{-\gamma_2 t}$$

Question 2 We are looking for the renewal function which is given by the Laplace transform

$$\tilde{m}(s) = \frac{F(s)}{1 - F(s)}$$

With

$$F(s) = \frac{p\gamma_1}{s + \gamma_1} + \frac{(1-p)\gamma_2}{s + \gamma_2}$$

we get

$$\tilde{m}(s) = \frac{s(p\gamma_1 + (1-p)\gamma_2) + \gamma_1\gamma_2}{s(s + (1-p)\gamma_1 + p\gamma_2)}$$

Question 3 The system considered can be described as a GI/M/1 queueing system. The number of items upon ingestion is thus geometrically distributed. The parameter of the geometric distribution is given as the solution in the interval (0,1) of the equation stated.

$$P(Q(A_n-) = i) = \left(\frac{19}{20}\right)^i \left(1 - \frac{19}{20}\right)$$

Question 4 The distribution of the food content is exponentially distributed (with an atom in zero). The mean of this distribution is:

$$\frac{19}{20} \frac{1}{\frac{1}{20}10} = 1.9$$