

## Solution for exercise 5.4.4 in Pitman

**Question a)** We introduce the random variable  $X_1$  as the time to failure of the first component and  $X_2$  as the additional time to failure of the second component. From the assumption  $X_1$  and  $X_2$  are independent and exponentially distributed with intensity  $2\lambda$ . The sum of two independent exponentially distributed random variables is gamma( $2, 2\lambda$ ) distributed.

**Question b)** The mean of the gamma distribution is  $\frac{2}{2\lambda} = \frac{1}{\lambda}$  and the variance is  $\frac{2}{(2\lambda)^2} = \frac{1}{2\lambda^2}$  (page 286,481).

**Question c)**

$$1 - e^{-2\lambda t_{0.9}}(1 + 2\lambda t_{0.9}) = 0.9$$

$$e^{-2\lambda t_{0.9}}(1 + 2\lambda t_{0.9}) = 0.1$$