expression (6) for the Cramér-Lundberg constant. Note, e.g., that (8) coincides with (6.9) and (9)—with (6.11) in von Bahr (1974). We shall not go into details of the calculations which yield (10) and (11) because they are quite analogous.

To prove the equality (14) of Lemma 1, one should notice that

$$\mathbf{E}\bar{U}_n \mathbf{1}_{\{S_n \leqslant 0\}} = \frac{n}{1+\rho} \sum_{k=n}^{\infty} \binom{n+k}{k} \left(\frac{\rho}{1+\rho}\right)^k \left(\frac{1}{1+\rho}\right)^n,$$

and that

$$\sum_{k=n}^{\infty} \binom{n+k}{k} a^k (1-a)^{n+1} = \sum_{k=0}^{\infty} \binom{2n+k}{n} a^{k+n} (1-a)^{n+1}$$

$$= \sum_{k=0}^{n} \binom{2n}{k} a^{2n-k} (1-a)^k, \quad a \in (0, 1),$$

which is easily seen to be the probability of $\{Bi(1-a, 2n) \leqslant n\}$, where $Bi(1-a, 2n)$ is a Binomial random variable with parameters $1-a$ and $2n$. From the other side, this probability could be expressed in terms of Beta-function $\mathbf{B}(k, m)$:

$$\mathbf{P}\{Bi(1-a, 2n) \leqslant n\} = 1 - \mathbf{B}^{-1}(n+1, n) \int_0^{1-a} t^n (1-t)^{n-1}\, dt,$$

which yields easily

$$\sum_{n=1}^{\infty} \mathbf{P}\{Bi(1-a, 2n) \leqslant n\} = \frac{2a - 3a^2}{(2a-1)^2}.$$

The proof of the equality (14) is now easy to complete.

To prove the rest of Lemma 1 one should use the similar arguments.

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Revised version received June 1994

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