Financial Mathematics

Piecewise constant processes

0052-1. Let $X^{(1)}, X^{(2)}, X^{(3)}, \ldots$ be the standard Brownian motion approx.

a. Compute $\lim_{N\to\infty} \mathrm{E}[(X_t^{(N)})^7]$.

b. Compute $\lim_{N\to\infty} \mathrm{E}[e^{7+3X_t^{(N)}}]$.

c. Compute $\lim_{N\to\infty} \mathrm{E}[(e^{8X_t^{(N)}} - e^8)_+]$.

Hint: Use the Central Limit Theorem.