

Till skrivvakten: det ska ges information på engelska i skrivningslokalen. Det ska vara linjerat papper som ska delas ut i skrivsalen.

This exam consists of five problems, each of which is worth 4 points. Marks:

Points	ECTS mark	Swedish mark
20	A	VG
18–19	B	VG
15–17	C	G
12–14	D	G
9–11	E	G

1. The Monte Carlo estimate of the option price is 10 kronas. The variance of the estimate is 9, the number of simulations is 900, and $z_{0.025} = 1.96$. Calculate the 95% confidence interval for the option price.
2. Let $p \in (0, 1)$. A random variable X has the following distribution: $P\{X = 0\} = p^2$, $P\{X = 1\} = 2p(1 - p)$, $P\{X = 2\} = (1 - p)^2$. Describe an algorithm to simulate X .
3. Let $0 = t_0 < t_1 < \dots < t_n$ be a fixed set of points. Describe the algorithm of simulation of the Brownian motion with drift $r(t)$ and diffusion coefficient $\sigma^2(t)$ on the above set.
4. Find the value of the parameter b , for which the variance of the control variate estimator $\hat{Y}(b)$ is minimal.
5. Which of the following sets are boxes? Explain.
a) $[1/2, 1)$ (1 p.) **b)** $[1/3, 2/3) \times [1/4, 5/8)$ (1 p.) **c)** $[0, 1/2) \times [1/5, 2/5)$ (1 p.)
d) $[1/3, 4/9) \times [1/5, 1/3)$ (1 p.)

Good luck!