MA323 lab 7
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Q1: The random variable 'I' can be generated using mean of random variable 'Y'

Thus, the expected value of 'I' can be written as

Exp[I] = Exp[Y]

Q2: The antithetic variable used is

$$Y_i = \frac{(exp(\sqrt{u_i}) + exp(\sqrt{1-u_i}))}{2}$$

'I' is generated my mean over Y_i

Thus, the variance must reduce around $(1 + \rho)/m$ times

Q3: The control variable used is $\sqrt{U}$

Thus the new value of 'I' is

$$I = I - \frac{cov(I,Y)}{var(Y)} \times (Y - \mu_y)$$

Where Y = $\sqrt{U}$

Thus, the variance must reduce around $Corr(I, Y)^2$ times