# MA323 Lab06 Report
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**Q1)**

$I = E[\exp(\sqrt{U})]$, where $U \sim U(0,1)$

**Exact value of I:**

$g(u) = e^{\sqrt{u}}$

$E(g(x)) = \int_{-\infty}^{\infty} f(x)\, g(x)\, dx$

here $f(x) = 1$ for $0 \le x \le 1$

hence,

$$E(g(U)) = \int_{0}^{1} g(u)\, du$$
$$= \int_{0}^{1} e^{\sqrt{u}}\, du$$
$$= 2$$

**Readings:**

| M | Estimated Value | Exact Value | Variance | 95% Confidence Interval |
|---|---|---|---|---|
| 100 | 2.04386543735336 | 2 | 0.1802665831695 | [1.960649, 2.127081] |
| 1000 | 1.99653338955341 | 2 | 0.1906342092631 | [1.969472, 2.023595] |
| 10000 | 2.00502865000467 | 2 | 0.1953010579989 | [1.996367, 2.013690] |
| 100000 | 1.99927311235734 | 2 | 0.1946108622165 | [1.996538, 2.002007] |

**Observations:**
- The estimated value of I converges to 2 as the sample size increases.
- The confidence interval size decreases as the sample size increases.