

Q1

Expected Value: 2.0015

**The 95% confidence interval corresponding to M=100
(1.9874,2.0155)**

Expected Value: 1.9971

**The 95% confidence interval corresponding to M=1000
(1.9928,2.0014)**

Expected Value: 2.0007

**The 95% confidence interval corresponding to M=10000
(1.9994,2.0019)**

Expected Value: 1.9999

**The 95% confidence interval corresponding to M=100000
(1.9995,2.0003)**

Q2.

Case 1:Monte Carlo Integration

Case 2:Anthithetic

| M | Expected value for case 1 | Expected value for case 2 | 95% confidence interval for case1 | 95% confidence interval for case2 | Ratio of the Interval |
|--------|---------------------------------|---------------------------------|--------------------------------------|--------------------------------------|--------------------------|
| 100 | 2.0775 | 2.0086 | (2.164941580,1.990068157) | (2.008648768,2.0085542) | 0.0005403363235 |
| 1000 | 2.003 | 2.0011 | (2.030117325,1.975936197) | (2.001080345,2.0010764) | 0.00007166951388 |
| 10000 | 1.9988 | 1.9999 | (2.007439975,1.990111026) | (1.999891788,1.9998916) | 0.000007476288189 |
| 100000 | 1.999 | 2 | (2.001711810,1.996240435) | (1.999969901,1.99996989 | 0.000000740815390 |

Q3.

**Expected Value corresponding to Monte Carlo Integration :
0.37655**

**99% confidence interval corresponding to Monte Carlo
Integration:
(0.37223 , 0.38087)**

Expected Value corresponding to Stratification : 0.35954

**99% confidence interval corresponding to Stratification :
(0.35925 , 0.35983)**