

```

P0 = 100; M = 100;  $\sigma$  = 0.4; r = 0.04; T = 1 / 12; K = 50 000;
nt = Ceiling[K ^ (1 / 3)]
dt = N[T / nt];
n = Ceiling[K ^ (2 / 3)]; N[n ^ (-1 / 2)]

q1 = RandomReal[{1, 1}, {nt}] * 2 - 1;
q2 = RandomReal[{1, 1}, {nt}] * 2 - 1;

Timing[dW = RandomReal[NormalDistribution[], {nt n}] Sqrt[dt];]
Timing[
  PE = 0; PV = 0;

  For[j = 0, j < n, j++,

    P1 = 0; P2 = 0; W = 0;
    For[i = 1, i < nt + 1, i++,
      P1 += dW[[i + j nt]] q1[[i]]  $\sigma$  + dt (r - q1[[1]]2  $\sigma^2$  / 2);
      P2 += dW[[i + j nt]] q2[[i]]  $\sigma$  + dt (r - q2[[1]]2  $\sigma^2$  / 2);
    ];

    PE += Max[Exp[P1] * P0 - M, 0] + Max[Exp[P2] * P0 - M, 0];
    PV += (Max[Exp[P1] * P0 - M, 0] + Max[Exp[P2] * P0 - M, 0]) ^ 2;

  ];

  {"Mean:", Exp[-r T] PE / n / 2, "StD of Mean:",
   Sqrt[Exp[-2 r T] / n / (n - 1) (PV - PE ^ 2 / n)] / 2}
]

37
0.0271363
{0., Null}
{0.686, {Mean:, 4.76972, StD of Mean:, 0.203098}}

{0., {Mean:, 24.6519, 2 StD of Mean:, 31.1709}}

Length[dW]
604 690
{8.673000000000002`, {" $\Delta$ optimal", 6.646556140251937`,
  "Mean:", 6.491543859748063`, "2 StD of Mean:", 0.25173132145321225`}}
{8.6890000000000078`, {" $\Delta$ optimal", 6.512490722736624`,
  "Mean:", 6.625609277263376`, "2 StD of Mean:", 0.2506573750267116`}}

```

q

```
{-0.285982, 0.923601, 0.639803, 0.422406, 0.10082, 0.380089, -0.294322, 0.375275,  
-0.00254129, 0.774328, 0.990967, 0.651742, -0.554088, 0.155843, -0.310518,  
-0.895309, -0.992843, -0.640844, -0.0564384, -0.539578, -0.356662, -0.294645,  
-0.148227, 0.190105, -0.1091, -0.463574, -0.107168, -0.936493, 0.576124, 0.717932,  
0.374295, 0.223451, -0.0139972, -0.0333307, -0.343194, -0.268152, 0.576741,  
0.313777, -0.358296, -0.241383, -0.0462941, 0.548784, 0.215299, 0.713564, 0.139515,  
-0.345406, 0.73864, -0.184431, 0.964857, 0.734011, -0.84804, -0.0571681, 0.0387827,  
0.656352, 0.0466423, 0.202881, -0.781325, -0.194701, 0.266813, -0.740787,  
0.344001, -0.591669, 0.599067, -0.801801, 0.185255, -0.0834809, -0.560673,  
-0.483573, -0.620448, 0.635771, -0.394194, 0.5212, 0.619087, -0.968944, -0.256176,  
-0.747977, 0.530584, 0.0129394, -0.870692, -0.00761525, 0.920152, -0.634952,  
-0.540797, -0.452696, 0.678044, 0.840823, -0.432584, 0.637086, -0.161272}
```