

AMS 321: Computer Projects in Applied Mathematics

Midterm-2007

Assignment Time: Friday (10/12/2007) 10:40

Collection Time: Friday (10/12/2007) 11:35

Location: Math SINC Site (S-235C) on-machine exam

Notes: (1) *Open Book and Own Lecture Notes; Calculators Allowed;* (2) *Do ANY Two Of The Three Problems; You Must Mark The Two Problems You Attempt and Will Only Grade The 1st Two If You Don't Mark;* (3) *Each Problem Is Worth 7.5 Points As Indicated and Max Score Is 15 Points; NO Additional Points for Doing More Than Two Problems*

1. Integrate the following by any one of the Monte Carlo methods:

$$I = \int_0^1 \sin(x^3) \cos(x^4) e^{x^5} dx$$

- (1) Iterate 100 to compute the integral J2 (**4.5 Points**)
 - (2) Iterate 10,000 to compute the integral J4 (**1 Point**)
 - (3) Iterate 1,000,000 to compute the integral J6 (**1 Point**)
 - (4) Compute $|J2-J6|/|J4-J6|$ (**1 Point**)
2. A company has 30,000 employees each receiving between 0 and 20 useful emails each day. The number of emails received follows a truncated Normal Distribution, i.e., very few people receive 0, 1, 19, or 20 emails. Please compute:
- (1) The number of people who receive 9 and more emails (**2.5 Points**)
 - (2) The percentage of people who receive 5 (incl) and fewer emails (**2.5 Points**)
 - (3) The average number of emails received per employee (**1.5 Points**)
 - (4) The most likely number of emails received (**1.0 Points**)
3. There are infinitely many infinitely long parallel lines on the floor. The distance between any two adjacent lines is "1". You drop a stick of length "1", randomly, to the floor 10,000 times. Each time, the stick either intersects a parallel line or not. During N "dropping" experiments, the stick intersects the parallel line M times. Perform numerical experiments (**5 Points**) for N=1000, 2000, 10,000 to compute N/M. Show your data by the following table (**0.5 Points**) and plot the result (**2.0 Points**).

N	1000	2000	...	10,000
N/M				