2006mid-term-simulaton 解答

2007 年 11 月 20 日

1

解答:The events are:

1. The arrival time of a customer
2. The departure time of a customer after being served.

The state variables are:

1. The status of the serveridle or busy
2. The number of customers waiting in queue
3. The time of arrival of each customers waiting in queue

2

- 解答:A simulation method which employs random numbers,u(0,1),for solving certain stochastic or deterministic problems

3

- 解答:A physcical model which represents actual system is called iconic model. In the pilot training system, a cockpit disconned from airplane is iconic model

4

- 解答:A variable or a mechanism that keeps track of the current time in a simulation,is called simulation clock
  1. Next event time advance
  2. Fixed increment time advance

5

解答:usually,we use the Exponential probability density function.As follows:

$$f(x) = \beta e^{-\beta x}$$

6

- a)in Dynamic simulation model
- b)in Stochastic simulation model

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$$u = x \longrightarrow du = dx \qquad I = [-xcosx] + \int_0^{2\pi} cosxdx$$
$$dv = sinxdx \longrightarrow v = -cosx \qquad I = [-xcosx + sinx](0\ 2\pi) = -2\pi$$

$$I = (b-a)\frac{\sum_{i=1}^{13} g(x_i)}{13} = (2\pi - 0)\frac{\sum_{i=1}^{13} x_i sinx_i}{13}$$
$$I = 2\pi\frac{-11.68}{13} = 0.9(-2\pi)$$

1. Using Integral:
2. Using Monte-Carlo:

1)

$$I = -2\pi$$

2)

$$I = -2\pi \times 0.9$$

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$a)D_1 = 0, D_2 = 5, D_3 = 5, D_4 = 5, D_5 = 5, D_6 = 5, D_7 = 0, D_8 = 4, D_9 = 4$
$\hat{d}(n) = \frac{\sum_{i=1}^{n} D_i}{n} = \frac{0+5+5+5+5+5+0+4+4}{9} = \frac{33}{9} = 3.66$
$b)T_A$:Duration of time for having i customers in the queue next page(back)
$T_0 = 2 + (14-11) + (21-20) = 2+3+1 = 6$
$T_1 = (3-2) + (11-10) + (16-14) + (20-18) = 1+1+2+2 = 6$

$T_2 = (4 - 3) + (10 - 9) + (18 - 16) = 1 + 1 + 2 = 4$
$T_3 = (5 - 4) + (9 - 8) = 1 + 1 = 2$
$T_4 = (6 - 5) + (8 - 7) = 1 + 1 = 2$
$T_5 = (7 - 6) = 1$

$$\hat{q}(n) = \frac{\sum_{i=0}^{\infty} iT_i}{T(n)} = \frac{0 \times 6 + 1 \times 6 + 2 \times 4 + 3 \times 2 + 4 \times 2 + 5 \times 1}{21}$$
$$\hat{q}(n) = \frac{6 + 8 + 6 + 8 + 5}{21} = \frac{33}{21} = 1.57$$
$$\hat{u}(n) = \frac{\sum_{t=0}^{21} B(t)}{T(n)} = \frac{(12 - 1) + (21 - 13)}{21} = \frac{11 + 8}{21} = \frac{19}{21} = 90$$