

國立中央大學九十學年度碩士班研究生入學試題卷

所別: 工業管理研究所 乙組 科目: 作業研究 共 1 頁 第 1 頁

答案請務必寫完整，否則將扣分

一、 解釋下列名詞 (25%)

1. Convex function. (5%)
2. Shadow price. (5%)
3. Traveling salesman problem. (5%)
4. Finite-state Markov chain. (5%)
5. Chapman-Kolomogrov equations. (5%)

二、 (15%) The following simplex tableau shows the optimal solution of a maximization Linear Programming (LP) problem. Suppose that x_3, x_4 are the slack variables in the first and second constraints of the original problem. These constraints are the \leq type.

	z	x_1	x_2	x_3	x_4	RHS
z	1	5	0	3	0	12
x_2	0	1	1	1	0	4
x_4	0	2	0	1	1	10

1. Write the original LP problem. (8%)
2. Obtain the optimal solution of the dual problem from the tableau. (7%)

三、 (10%) Suppose that a random variable T has an exponential distribution. Show that $P\{T > t + \Delta t \mid T > \Delta t\} = P\{T > t\}$.

四、 (20%) Parking lot at A department is limited to only five spaces. Cars making use of this space arrive according to a Poisson distribution at the rate of six cars per hour. Parking time is exponentially distributed with a mean of 30 minutes. Visitors who cannot find an empty space immediately on arrival may temporarily wait inside the lot until a parked car leaves. The temporary spaces can hold only three cars. All other cars that cannot park or find a temporary waiting space must go elsewhere. Determine the following:

1. The probability p_n of n cars being in the system. (7%)
2. The effective rate at which cars arrive the lot. (7%)
3. The average number of occupied parking spaces. (6%)

五、 (15%) Solve the following problem by using Kuhn-Tucker conditions.

$$\text{Maximize } f(\mathbf{x}) = \ln(x_1 + x_2)$$

Subject to

$$x_1 + 2x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

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六、 (15%) Describe how to use Monte Carlo simulation to estimate the area of a circle whose equation is

$$(x-1)^2 + (y-2)^2 = 25.$$