國立成功大學 109 學年度碩士班招生考試試題

系　　所：工業與資訊管理學系

考試科目：生產與作業管理　　考試日期：0211，節次：2

※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (10%) You have been hired as an external consultant to improve processes at a business. You are unfamiliar with exactly how the work is currently done but are intimately familiar with charting techniques and data analysis tools. What is a general sequence for use of these tools and why should you use them in the sequence you specify?

2. (10%) What is the relationship between type I and type II errors and the width of the upper and lower control limits on SQC control charts? Propose a mechanism for determining SQC chart limit widths based upon the financial consequences of type I and type II errors.

3. (10%) A company makes four different products, i.e., Models H, G, L and M. The Model H sells for $200 and has $40 in parts and $40 in labor; the Model G sells for $150 and requires $30 in parts and $30 in labor; the Model L sells for $100 and has $20 in parts and $20 in labor; and the Model M sells for $75 but requires only $10 of parts and $10 of labor. This company has four machines, called A, B, C, and D, that are used in the production of each of these products. Each of these machines is available for 40 hours a week and there is no setup time required when shifting from the production of one product to any other. The processing requirements to make one unit of each product are shown in the following table.

	Processing time on each machine in minutes			
Model	Machine A	Machine B	Machine C	Machine D
H	10	15	15	5
G	10	10	10	10
L	5	10	15	10
M	5	5	5	10

The company has monthly fixed costs of $5000 and has a demand forecast of 80 Model H, 60 Model G, 40 Model L and 20 Model M for the coming month. How many of each of the four models should the operations manager schedule for production this month?

4. A supermarket uses both cashiers and baggers to serve customers at check out. During the first 6 hours of each workday (Monday–Friday), 4 cashiers and 2 baggers serve approximately 20 customers per hour. A cashier and a bagger who require approximately 5 minutes at checkout and 5 minutes at bagging serve each customer.
   (1) (8%) Calculate the utilization of both cashiers and baggers.
   (2) (12%) Assume that both cashiers and baggers are cross-trained to perform both activities so that they can serve customers independently. Customers are now both checked and their groceries bagged by one individual. Further, assume that it takes 12 minutes for one individual to both cash out and bag each customer's groceries. Calculate the utilization of this new group of 6 cross-trained employees. If this supermarket requires a 10 percent capacity cushion, how many employees should it schedule?

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5. NCKU Hotel has a housekeeping department responsible for cleaning towels, bedsheets, and other stuffs. The hotel manager intends to maintain 98% customer's service level on towels supply Please answer following questions and the hotel manager intends to maintain 98% customer's service level.

a. (5%) What is the reorder point if the lead time for ordering towels is 3 days and the probability of towels used daily is shown as followed:

Daily usage	probability
450	0.2
480	0.25
500	0.3
560	0.20
600	0.05

b. (5%) What is the reorder point if the lead time for ordering towels is 3 days and the probability of towels used daily is normally distributed with mean = 500 and standard deviation =81.

c. (5%) What is the reorder point if the lead time for ordering towels is normally distributed with mean=3 days and standard deviation=1 day and the probability of towels used daily is normally distributed with mean = 500 and standard deviation =81.

6. (20%) The processing time and due dates for six orders in one machine are shown as follow:

Order number	1	2	3	4	5	6
Processing time	3	6	8	4	2	1
Due date	4	8	12	15	11	25

a. (15%) Please determine the job sequences by following objectives:

(1) (5%) Mean tardiness

(2) (5%) Average Number of jobs in the system

(3) (5%) Maximum lateness

b. (5%) What is Makespan ? Can you show the Makespan for above problem?

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7. (15%) For the following information,

Task	time	predecessor
A	15	--
B	5	A
C	4	B
D	4	B
E	3	D
F	15	B
G	30	F
H	4	G
I	10	E
J	20	H, I
K	5	C, J

Please draw the network and find the CPM for the network. Also please find the slack for each task.

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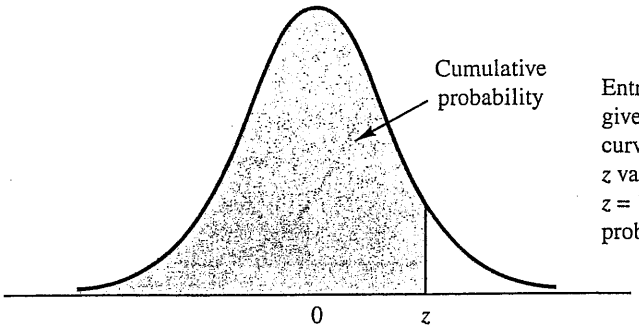
TABLE 1 CUMULATIVE PROBABILITIES FOR THE STANDARD NORMAL DISTRIBUTION (*Continued*)



Entries in the table give the area under the curve to the left of the z value. For example, for $z = 1.25$, the cumulative probability is .8944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990