

國立成功大學

111學年度碩士班招生考試試題

編 號： 195

系 所： 製造資訊與系統研究所

科 目： 生產管理

日 期： 0219

節 次： 第 2 節

備 註： 不可使用計算機

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

1. A competitor of Kozar International, Inc. has begun marketing a new instant-developing film project. Kozar has had a similar product under study in its R&D department but has not yet been able to begin production. Because of the competitor's action, top managers have asked for a speedup of R&D activities so that Kozar can produce and market instant film at the earliest possible date. The table below shows the predecessor information and activity time estimates in months, estimates of the optimistic, most probable, and pessimistic times. What is the probability the project will be completed in time for Kozar to begin marketing the new product within 27 months? **(25%)**

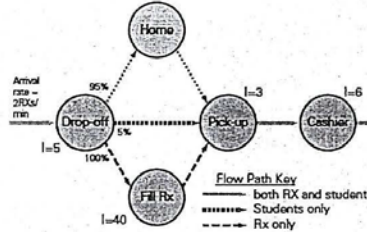
Activity	Immediate Predecessor	Optimistic Time	Most Probable Time	Pessimistic Time
A	---	1	1.5	5
B	A	3	4	5
C	A	1	2	3
D	B,C	3.5	5	6.5
E	B	4	5	12
F	C,D,E	6.5	7.5	11.5
G	E	5	9	13

2. Supreme Auto Parts produces components for motorcycle engines. It has plants in Amarillo, Texas, and Charlotte, North Carolina, and supply factories in Detroit and Atlanta. Production and cost data for a major component are as follows.

Plant	Freight Costs		Capacity	Unit Cost
	Detroit	Atlanta		
Amarillo	\$12	\$8	1,200	\$125
Charlotte	\$9	\$3	3,000	\$140
Demand	2,000	900		

- (a) Formulate a transportation model to determine the best distribution plan. **(10%)**  
 (b) Solve the above transportation model to find the optimal objective and optimal solutions. **(15%)**
3. The Wilcox Student Health Center has just implemented a new computer system and service process to "improve efficiency." The process flowchart and analysis framework is also provided. As pharmacy manager, you are concerned about waiting time and its potential impact on college students who "get no respect." All prescriptions (Rx) go through the following process:

Assume that students arrive to drop-off Rx's at a steady rate of two Rx's per minute, with an average of one Rx per student. The average number of students in process (assume waiting and being serviced) at each station is: DROP-OFF—five students, PICK-UP—three students and PAY CASHIER—six students.



WIP = R*T	Drop Off	Fill RX	Pick Up	Cashier	Totals
Inventory (WIP)					
Throughput Rate (R)					
Flow Time (T)					

The fill Rx station typically has 40 Rx's in process and waiting on average. Because of this perceived long wait, 95 percent of the students decide to come back later for pick-up. They come back an average of three hours later. If the students choose to stay, each name is called as soon as the Rx is filled and the student then enters the pick-up line. Assume that the system is operating at a steady state.

- (a) What is the average time a student spends in the pharmacy if they stay to pick-up their Rx? (5%)
- (b) How many minutes does the student spend in the pharmacy if he or she picks-up the Rx 3 hours later (i.e., the student goes home after dropping the Rx off)? (10%)
- (c) What is the average time in minutes that the Rx spends in the process? Count time from entering the drop-off line to completing payment. (10%)

4. High Tech, Inc. is a virtual store that stocks a variety of calculators in their warehouse. Customer orders are placed, the order is picked and packaged, and then shipped to the customer. A fixed order quantity inventory control system (FQS) helps monitor and control these SKUs. The following information is for one of the calculators that they stock, sell, and ship.

Average demand	12.5 calculators per week
Lead time	3 weeks
Order cost	\$20/order
Unit cost	\$8.00
Carrying charge rate	0.25
Number of weeks	52 weeks per year
Standard deviation of weekly demand	3.75 calculators
SKU service level	95 percent

- |  |                |      |
|--|----------------|------|
| Current on-hand inventory  | 35 calculators |      |
| Scheduled receipts   | 20 calculators |      |
| Backorders   | 2 calculators  |      |
| (a) What is the Economic Order Quantity?   |                | (5%) |
| (b) What is the total annual order and inventory-holding costs for the EOQ?  |                | (5%) |
| (c) What is the reorder point without safety stock?  |                | (5%) |
| (d) What is the reorder point with safety stock?   |                | (5%) |
| (e) Based on the previous information, should a fixed order quantity be placed, and if so, for how many calculators? |                | (5%) |

Appendix: Cumulative Standard Normal Distribution

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.500000	0.503989	0.507978	0.511967	0.515953	0.519939	0.523922	0.527903	0.531881	0.535856
0.1	0.539828	0.543795	0.547758	0.551717	0.555670	0.559618	0.563559	0.567495	0.571424	0.575345
0.2	0.579260	0.583166	0.587064	0.590954	0.594835	0.598706	0.602568	0.606420	0.610261	0.614092
0.3	0.617911	0.621719	0.625516	0.629300	0.633072	0.636831	0.640576	0.644309	0.648027	0.651732
0.4	0.655422	0.659097	0.662757	0.666402	0.670031	0.673645	0.677242	0.680822	0.684386	0.687933
0.5	0.691462	0.694974	0.698468	0.701944	0.705401	0.708840	0.712260	0.715661	0.719043	0.722405
0.6	0.725747	0.729069	0.732371	0.735653	0.738914	0.742154	0.745373	0.748571	0.751748	0.754903
0.7	0.758036	0.761148	0.764238	0.767305	0.770350	0.773373	0.776373	0.779350	0.782305	0.785236
0.8	0.788145	0.791030	0.793892	0.796731	0.799546	0.802338	0.805106	0.807850	0.810570	0.813267
0.9	0.815940	0.818589	0.821214	0.823815	0.826391	0.828944	0.831472	0.833977	0.836457	0.838913
1.0	0.841345	0.843752	0.846136	0.848495	0.850830	0.853141	0.855428	0.857690	0.859929	0.862143
1.1	0.864334	0.866500	0.868643	0.870762	0.872857	0.874928	0.876976	0.878999	0.881000	0.882977
1.2	0.884930	0.886860	0.888767	0.890651	0.892512	0.894350	0.896165	0.897958	0.899727	0.901475
1.3	0.903199	0.904902	0.906582	0.908241	0.909877	0.911492	0.913085	0.914657	0.916207	0.917736
1.4	0.919243	0.920730	0.922196	0.923641	0.925066	0.926471	0.927855	0.929219	0.930563	0.931888
1.5	0.933193	0.934478	0.935744	0.936992	0.938220	0.939429	0.940620	0.941792	0.942947	0.944083
1.6	0.945201	0.946301	0.947384	0.948449	0.949497	0.950529	0.951543	0.952540	0.953521	0.954486
1.7	0.955435	0.956367	0.957284	0.958185	0.959071	0.959941	0.960796	0.961636	0.962462	0.963273
1.8	0.964070	0.964852	0.965621	0.966375	0.967116	0.967843	0.968557	0.969258	0.969946	0.970621
1.9	0.971283	0.971933	0.972571	0.973197	0.973810	0.974412	0.975002	0.975581	0.976148	0.976705
2.0	0.977250	0.977784	0.978308	0.978822	0.979325	0.979818	0.980301	0.980774	0.981237	0.981691
2.1	0.982136	0.982571	0.982997	0.983414	0.983823	0.984222	0.984614	0.984997	0.985371	0.985738
2.2	0.986097	0.986447	0.986791	0.987126	0.987455	0.987776	0.988089	0.988396	0.988696	0.988989
2.3	0.989276	0.989556	0.989830	0.990097	0.990358	0.990613	0.990863	0.991106	0.991344	0.991576
2.4	0.991802	0.992024	0.992240	0.992451	0.992656	0.992857	0.993053	0.993244	0.993431	0.993613
2.5	0.993790	0.993963	0.994132	0.994297	0.994457	0.994614	0.994766	0.994915	0.995060	0.995201
2.6	0.995339	0.995473	0.995604	0.995731	0.995855	0.995975	0.996093	0.996207	0.996319	0.996427
2.7	0.996533	0.996636	0.996736	0.996833	0.996928	0.997020	0.997110	0.997197	0.997282	0.997365
2.8	0.997445	0.997523	0.997599	0.997673	0.997744	0.997814	0.997882	0.997948	0.998012	0.998074
2.9	0.998134	0.998193	0.998250	0.998305	0.998359	0.998411	0.998462	0.998511	0.998559	0.998605
3.0	0.998650	0.998694	0.998736	0.998777	0.998817	0.998856	0.998893	0.998930	0.998965	0.998999
3.1	0.999032	0.999065	0.999096	0.999126	0.999155	0.999184	0.999211	0.999238	0.999264	0.999289
3.2	0.999313	0.999336	0.999359	0.999381	0.999402	0.999423	0.999443	0.999462	0.999481	0.999499
3.3	0.999517	0.999533	0.999550	0.999566	0.999581	0.999596	0.999610	0.999624	0.999638	0.999650
3.4	0.999663	0.999675	0.999687	0.999698	0.999709	0.999720	0.999730	0.999740	0.999749	0.999758
3.5	0.999767	0.999776	0.999784	0.999792	0.999800	0.999807	0.999815	0.999821	0.999828	0.999835
3.6	0.999841	0.999847	0.999853	0.999858	0.999864	0.999869	0.999874	0.999879	0.999883	0.999888
3.7	0.999892	0.999896	0.999900	0.999904	0.999908	0.999912	0.999915	0.999918	0.999922	0.999925
3.8	0.999928	0.999931	0.999933	0.999936	0.999938	0.999941	0.999943	0.999946	0.999948	0.999950
3.9	0.999952	0.999954	0.999956	0.999958	0.999959	0.999961	0.999963	0.999964	0.999966	0.999967