1. (10 pts) The management of NTHU bank was concerned about the potential loss that might occur in the event of a physical catastrophe such as a power failure or a fire. The bank estimated that the loss from one of these incidents could be as much as $100 million, including losses due to interrupted service and customer relations. One project the bank is considering is the installation of an emergency power generator at its operations headquarters. The cost of the emergency generator is $900,000, and if it is installed no losses from this type of incident will be incurred. However, if the generator is not installed, there is a 10% chance that a power outage will occur during the next year. If there is an outage, there is a 0.04 probability that the resulting losses will be very large, or approximately $90 million in lost earnings. Alternatively, it is estimated that there is a 0.96 probability of only slight losses of around $2 million. Using decision tree analysis, determine whether the bank should install the new power generator.

2. (5 pts) The NTHU Furniture Company manufactures two-drawer oak file cabinets that are sold unassembled through catalogues. The company initiates production of N cabinet packages each week. The percentage of good quality cabinets averages G percent per week, and the percentage of poor-quality cabinets that can be reworked is R percent.
   (2-1) (2 pts) Determine the weekly product yield (in terms of units) of file cabinets.
   (2-2) (3 pts) If the company desires a product yield of I units per week, what should be the percentage of good-quality products?

3. (5 pts) NTHU Tech is trying to determine how best to produce its newest product, Fantastic Keyboards. The keyboards could be produced in-house using either Process A or Process B, or purchased from a supplier. Cost data are given below. For what levels of demand should each process be chosen assuming $F_A > F_B$ and $V_S > V_B > V_A$.

	Fixed Cost	Variable Cost
Process A	$F_A	$V_A
Process B	$F_B	$V_B
Supplier	$0	$V_S

4. (10 pts) NTHU Pizza offers large pepperoni pizzas for p dollars on Tuesdays from 5:00 to 9:00 in the evening. Three cooks are on duty during that time. The fixed cost for the four-hour period is c_f. The variable cost is c_v per pizza.
   (4-1)(5 pts) If it takes t minutes to prepare each pizza, worker efficiency is approximately r percent and employees get a b minute break each hour, how many pepperoni pizzas can NTHU Pizza produce during its four hour special?
   (4-2)(5pts) Assuming all pizzas produced can be sold, what is the condition that NTHU Pizza makes profit during its four hour special?

5. (10 pts) The NTHU Insurance Company has a large pool of clerical employees who process insurance application forms on networked computers. When the company hires a new clerical employee, it takes that person about t_1 minutes to process a form. The learning curve for the job is p percent, but no additional learning will take place after about n^{th} forms is processed. NTHU has recently acquired a smaller competitor that will add 800 new forms per week to its clerical pool. If an employee works six hours per day per five day week. How many employees would be hired to absorb the extra workload assuming these employees are fully trained?

6. (5 pts) Explain the following terms:
   (6-1) (1 pt) ABC system
   (6-2) (1 pt) Continuous inventory system
   (6-3) (1 pt) Periodic inventory system
   (6-4) (1 pt) Dependent demand
   (6-5) (1 pt) Safety Stock

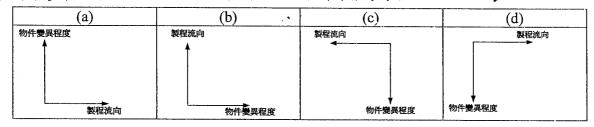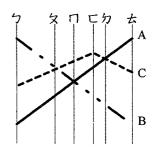7. (5 pts) List five ways to reduce inventory while maintain similar service level and explain why they work.

8. (23 pts)如右圖所示，A、B、C 三線段分別代表 MTS、ETO、ATO 三種產品定位策略於「製程流向」與「物件變異程度」兩維度所對應之圖示。請回答以下問題：

(8-1) (5 pts)此三線段所對應之座標軸與方向以下列何者為對？

(a)	(b)	(c)	(d)
物件變異程度 ↑ → 製程流向	製程流向 ↑ → 物件變異程度	製程流向 ← ↓ 物件變異程度	製程流向 → ↓ 物件變異程度

(8-2) (6 pts)右圖乃將 A、B、C 三線段在極值與交叉點處劃下剖線，而形成ㄅ～ㄊ的六個階段。試問針對 A、B、C 三種策略而言，其 MPS 所發生的階段分別為ㄅ～ㄊ的何者？

(8-3) (3 pts)承上，A、B、C 三種策略的最後組裝排程（FAS）又分別發生於何階段？
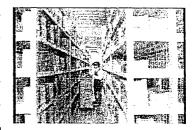
(8-4) (3 pts) MTO 產品定位策略所對應的圖示應為 A、B 或 C 之何線段？

(8-5) (3 pts)在 MTS、ETO、ATO、MTO 等產品定位策略中，何種為製造者預先擁有最終產品的 BOM？

(8-6) (3 Pts)在 MTS、ETO、ATO、MTO 等產品定位策略中，「消費型產品」多以何種產品定位策略進行生產？

[註] 請根據以下形式在答案卷上總結你的答案；**且此題組採「倒扣制」，答錯倒扣該答案 1/2 的分數、未答則不倒扣，請務必謹慎作答**）：

(8-1)	(8-2)			(8-3)			(8-4)	(8-5)	(8-6)
	A	B	C	A	B	C			

9. (27 pts) A 公司為圖書產業之發行商，負責經銷來自上游多家出版社的書籍，以銷售給下游之書局進行零售。當各書局將書籍銷售完畢後，乃向 A 公司營業單位下達補書訂單，再透過 A 公司的揀貨人員自補書作業區之庫房架位挑取書籍（如右圖所示），以滿足客戶訂單需求。A 公司三樓庫房架位上某書籍的庫存量若低於再訂購點，則透過定量訂購模式(s,Q)模式（也就是當存貨水準等於或低於再訂購點(s)時，發出訂購單(Q)以補充庫存量）向上游出版社再訂購書籍，以能不缺貨地滿足客戶後續之補書需求。已知某書籍過去一年（各月皆以 30 日計）的需求與訂購狀況如下表，且此書籍的持有成本、訂購成本皆為已知，試回答以下問題：

	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月
下游書局總需求量	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}
向出版社訂購時間	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}
出版社書籍送達時間	E_1	E_2	E_3	E_4	E_5	E_6	E_7	E_8	E_9	E_{10}	E_{11}	E_{12}

(9-1) (8%)試說明你如何由過去一年之資料推斷此個案是否適合使用 EOQ 模式決定的訂購量(Q)？

(9-2) (12%)承上，若選擇使用 EOQ 模式，試問再訂購點(s)為多少？Safety Stock 為多少？Service Level 為多少？而以上結論與何假設有關？

(9-3) (7%)若未選擇使用 EOQ 模式，請說明如何使用上表資料決定 Safety Stock？（假設 Service Level 為已知）