1. (8) Assume that a company wants to use compression technology during the transmission of data on its network. The network is used to support the company's order-entry system and also for electronic mail. Which compression approach (lossy or lossless) would be better? Explain.

2. (8) Why is RISC technology argued to be faster than CISC technology? How has CISC technology been able to remain competitive with RISC technology?

3. (8) In recent years some companies have begun performing what has been called "mass customization". By using flexible manufacturing systems, networks, and data bases they are able to create products designed exclusively for a specific customer. For example, Levi's has a service where they make a custom pair of jeans for a customer. They do this by sending key measurements of the customer electronically to their manufacturing facility in South Carolina where the automated cutting machines cut the material to meet the customer's requirements. The jeans are the sent directly to the customer via FedEx overnight delivery. The cost of these jeans is about $8 more than buying a standard size pair of jeans off the shelf.

   Would you classify mass customization as primarily focusing on efficiency or effectiveness? Briefly explain.

4. (10) Assume that a stock brokerage firm has a legal responsibility to maintain copies of key operating data. This includes every transaction made by the firm on a daily basis. The amount of data averages about 200 megabytes per day. These copies are not routinely accessed but need to be available in case of audits or other inquiries.

   What type of secondary disk storage makes sense for this application? What characteristics of your choice lead you to select it? (Be sure to limit your answer to only disk storage options.)

5. (8) Optical character recognition (OCR) is used by many firms in their attempts for automate their source document processing. What factors impact the accuracy of OCR?

6. (8) Assume that your home computer has a modem that is rated at 28.8K bits per second and you want to download a file from the world wide web that is 100,800 bytes in length. Assume that your modem uses start-stop bits as part of its communication protocol and that no compression is used. Also assume that the rated speed is actually achieved. Given these facts, how long will it take to complete the download? Provide your answer in seconds.

7. (8) A friend purchased Microsoft Office for her Intel Pentium computer several months ago. Her computer uses Microsoft Windows version 3.1. However, her new employer has provided her with a copy of Windows 95 (to replace Windows 3.1) and an updated version of Microsoft Office that is written for Windows 95.

   You own an Apple Power Macintosh and you do not have Microsoft Office. Your friend has offered to sell you her now unneeded version of Microsoft Office and all the documentation for $25. After checking the license agreement, you conclude that this transfer is legal. Should you make the purchase? Explain.

8. (8) Assume that a company runs its payroll program on an IBM computer and then replaces the IBM computer with a computer from a different vendor (like Digital Equipment Corp.). Explain the technology and process that lets them do this and still use the same payroll program (i.e., the payroll program does not need to be rewritten).

9. (8) I acquired a legal copy program called MacInTax to help me complete my tax return for 1995. After completing my return, I offered to use the software to complete my mother's and sister's tax returns. I also offered to use the software to complete my neighbor's return.

   Can I legally do this? What determines the answer to this question?

10. (9) You need to purchase a database management system for your company. You're looking at two choices. The first, called System 833, supports the network model. The second, called NTuple, supports the relational model.

    Do you consider this information important in your purchasing decision? Explain.

11. (8) Some cable television companies are participating in the development of digital "cable modems". What advantage(s) would you expect that a cable modem might have over a regular modem?

12. (9) You can purchase software that claims to expand your RAM capacity. For example, there is a program called "Ram Doubler" that claims to double your RAM capacity. Is this really possible? Explain.

1. The only logical choice is lossless compression. This is because the network will carry data (order information) and text (electronic mail). If you lose any bits (as would happen in the lossy approach), the data and text would be corrupted and not be unusable.

2. RISC is argued to be faster than CISC because the average number of cycles per instruction in RISC technology is lower than in CISC technology. Thus, for the same MHz rating, more instructions can be completed per second.

   CISC has been able to maintain performance that is competitive with RISC because computer engineers have been able to increase the number of MHz for CISC CPUs. This results in a competitive number of instructions per second.

3. The primary focus of mass customization is effectiveness. It provides a service that customers want. The fact that Levi's production process is efficient makes it possible for them to provide the service at a reasonable price but the main focus is improved customer product/service effectiveness.

4. The problem requirements include large data storage capacity (about 1 gigabyte/week). The backup also has to be reliable with a long shelf life because it is needed for auditing or other related archival purposes.

   The best secondary storage option for this application is CD-R (CD Recordable). CD-R has over 600 Mb capacity per disk, is very inexpensive on a cost/byte basis, and is a reliable technology with long shelf life. The fact that it is write once does not matter in this case.

5. The accuracy of OCR is dependent on two primary factors. The first is the quality of the original source document. This includes the legibility of characters as well smudges and other "noise" on the document. The second factor is the quality of the OCR software. Some software does a better job identifying characters that are formed poorly or blurred due to dirt or ink smudges.

6. If the modem can transmit at 28,800 bits/second then it can transmit 2,880 bytes per second (assuming each 8-bit byte includes the 2 extra start/stop bits). Thus, the time to transmit the file would be 100,800 bytes / 2,880 bytes/sec. which equals 35 seconds.

7. No. Microsoft Office is provided in object code form so the copy of Office your friend wants to get rid of is in machine language for an Intel CPU. Your computer is not an Intel CPU—it's a PowerPC. Thus, the software would not work in the Power Mac. (Note: if you had a software package on your Mac that emulated a Windows machine, i.e., software that imitated a Windows

machine, then you could use it, but performance would likely be slower using emulation)

8. The technology is a software product called a compiler. Compilers accept source code (the payroll program) and translate it into object (machine language) code for a specified CPU. If you change computers (and have a different CPU), then you need to use a different compiler that translates the same source code into object code for your new CPU.

9. You cannot really answer the question "Is it legal?" unless you have read and understood the license agreement. The software license determines the legality of situations such as this.

   For your information, the answer to the specific question posed for MacInTax is a conditional yes. I could do anyone's tax return with my copy as long as I did not charge them for the service.

10. The fact that one package supports the network model and the other supports the relational model is very important to your decision. While both models support many-to-many relationships, the network model is an early binding system and the relation model is a late binding system. This means that the network DBMS will be able to respond quickly to prespecified queries but will not be flexible in handling unanticipated (*ad hoc*) queries. On the other hand, the relational DBMS will be very good at responding to *ad hoc* queries but will generally have a slower response time for all types of queries.

11. The two advantages are speed and reliability. Coaxial cable can transmit data very fast over a WAN (engineers say that it has a wide bandwidth). This means that data/video can be sent at higher rates of speed than twisted pair (telephone line) over long distances. The fact that the technology is digital means that error detection and recovery technology can reduce the errors during transmission making the system more reliable.

12. It is not possible to double your RAM capacity without twice as much real RAM. A program like Ram Doubler is likely using some form of virtual memory technology expanding your RAM onto a disk so that it appears that you have twice as much RAM. However, performance will be degraded (compared to actually installing more real RAM) using this technique because moving data/instructions between RAM and its "virtual extension" on disk will be slow.

    Ram Doubler might also be using compression techniques to compress the data/instructions in RAM. This would have to use a lossless compression approach and would also degrade performance because of the time it would take to compress and decompress RAM.