رقم الشعبة: 1 الرقم التسلسلي: الاسم:

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Instructions: Time **10** minutes. Closed books and notes. No calculators. Please answer all problems in the space provided. **No questions are allowed**.

<Good Luck>

Q1. Give two reasons why backup of hard disks using tapes is losing popularity.

1. **Hard disks are getting cheaper compared to tapes. It is economical to back up on another disk.**

2. **Hard disks are getting larger. Backup takes many tapes and long time.**

<2 marks>

Q2. If the probability of one disk failure in a RAID system is x, give three reasons why the probability of two concurrent disk failures in practice is higher than x^2?

1. **Operator accidentally replaces the wrong disk during a failure**

2. **Since disk bandwidth is growing more slowly than disk capacity, the MTTR a disk is increasing, thus increases the chances of a 2nd failure during repair.**

3. **Reading much more data during reconstruction means increasing the chance of an uncorrectable media failure, which would result in data loss.**

<3 marks>

Q3. Rewrite the following code to run on two processors using shared-memory programing. Assume that the two processors have IDs Pn = 0 and Pn = 1.

```
for (i = 0; i < 1000; i = i + 1)
  for (j = 0; j < 1000; j = j + 1)
    C[i][j] = A[i][j] + B[i][j];



for (i = 500*Pn; i < 500*(Pn+1); i = i + 1)
  for (j = 0; j < 1000; j = j + 1)
    C[i][j] = A[i][j] + B[i][j];
```

Or

```
for (i = 0; i < 1000; i = i + 1)
  for (j = 500*Pn; j < 500*(Pn+1); j = j + 1)
    C[i][j] = A[i][j] + B[i][j];
```

<5 marks>