**COMP 2130, Fall 2012**

**Quiz 5, November 30, 2012**

Student Name: Student Number:

1. (2 marks) Optimize the following code.

for (i = 1; i <= m; i++)

 for (j = 0; j < n; j++)

 b[j + n/i] = a[j];

1. (2 marks) If this function is called with xp equal to yp, what effect will it have?

void exchange(int \*yp, int \*xp) {

 \*xp = \*xp - \*yp;

 \*yp = \*xp - \*yp;

 \*xp = \*xp + \*yp;

}

1. (2 marks) Find and explain what is wrong in the following code:

float \*fool () {

 float data;

 data = 20.5;

 return &data;

}

1. (2 marks) Find and explain what is wrong in the following code:

float \*search(float val, float \*p) {

 while (\*p && \*p != val)

 p = p + sizeof(float);

 return p;

}

1. (2 marks) Compute the average time (in ms) to access a sector on the following disk:

Rotation rate: 5600 RPM; average seek time: 4 ms; average number of sectors / track: 600

1. (2 marks) List the five types of non-volatile memory.
2. (2 marks) Explain two ideas how to improve the following code:

 for (i=0; i < length(v); i++) {

 get\_element(v, i, &data); // it changes only data.

 \*dest = \*dest \* data; //

 }

1. (2 marks) In the following code, what references have spatial locality? What references have temporal locality? (You will need to think all the data references and instruction references.)

data = 0;

for (i = 0; i < m; i++)

 data \*= b[i];

return data;

1. (2 marks) Improve the following code so that the code can have the locality property:

int sum(int a[K][N][M]) {

 int i, j, k, sum = 0;

 for (j = 0; j < M; j++)

 for (k = 0; k < N; k++)

 for (i = 0; i < K; i++)

 sum += a[i][k][j];

 return sum;

}