Name: _____

Directions: **Work only on this sheet** (on both sides, if needed). MAKE SURE TO COPY YOUR ANSWERS TO A SEPARATE SHEET FOR SENDING ME AN ELECTRONIC COPY LATER.

1. (20) Fill in the blank: The set of parallel wires connecting the CPU to memory is called a _____.

2. Say we have a 5-bit word size. In each part below, answer with two bit strings, separated by a space, such as

```
01010  11110
```

(a) (10) Find the signed-magnitude and 2s complement representations (in that order) of 5.

(b) (10) Find the signed-magnitude and 2s complement representations (in that order) of -5.

3. (20) What is printed out?

```
int  x[3][4]  {5,3,8,2,1,8,3,7,88,168,8,8888};
printf("%d",x[2][1]);
```

4. (20) Suppose we are a 32-bit Intel machine. Say **z** is declared as **int**, **&z = 200** and **z** contains $1 \cdot 16^5 + 2 \cdot 16^4 + 3 \cdot 16^3 + 4 \cdot 16^2 + 5 \cdot 16 + 6$. State the contents (as a base-10 number) of Byte 202.

5. (20) Say we have a disk with a rotation speed of 9600 revolutions per minute, 1000 tracks, a seek speed of 10^{-6} seconds per track, and a sector size of 528 bytes. Give the time in seconds for a read request to start, measured from the start of the seek and the time the first byte is read. Give your answer as an R expression. Assume that at the time the seek begins: the read/write head is at the innermost track; the desired sector is in the middle track; and the start of the sector is a half revolution from the read/write head when the seek completes.

Solutions:

1. bus

2a. 00101 00101

2b. 10101 11011

3. 168

4. c(**z**) = 0x123456, and we are on a little-endian machine, so 0x56 is in Byte 200, 0x34 in Byte 201 and 0x12 = 18 is in Byte 202.

5.

seek time: $0.5 * 1000 * 0.000001$

rotation time before read first byte: $0.5 * 1/(9600/60)$

total: $0.5 * 1000 * 0.000001 + 0.5 * 1/(9600/60$