1 Git

5. Run "./homework-1 8" to check out the answer!
6. Run "./homework-1 8" to check out the answer!
7. Run "./homework-1 8" to check out the answer!

2 Floating-point arithmetics

2. An example of subnormal number is 2^{-1023}. Alternatively, run "./homework-1 2" to check out the answer!

3 Cache efficiency

1. For a 12-way associative, 6MiB = 6291456 bytes L3 cache with a 64-byte cache line, there are $6291456/64 = 98304$ cache lines, and $98304/12 = 8192$ cache blocks. Given that an int takes up 4 bytes (in C++), each cache line can store $64/4 = 16$ integers, and each cache block has $16 \times 12 = 192$ integers.

   The worst-case *npasses* occurs when we take in each cache line, and have space in some other blocks. So the worst-case is $npasses = 16 \times 8192n + l = 131072n + l$ where $n \in \mathbb{N}$ and $l \in \{0, 1\}$.

2. On my machine, it has a 16-way associative, 8192K bytes L3 cache with 64-byte cache line. There are $8192 \times 2^{10}/64 = 131072$ cache lines, and $131072/16 = 8192$ cache blocks. Given that an int takes up 24 bytes (in Python 2.7), each cache line can store $\lfloor 64/24 \rfloor = 2$ integers.

   The worst-case *npasses* occurs when we take in each cache line, and have space in some other blocks. So the worst-case is $npasses = 2 \times 8192n + l = 16384n + l$ where $n \in \mathbb{N}$ and $l \in \{0, 1\}$.

3. The array has a size of $100,000$.