Homework #1: C++ refresher (100 points)
Submit a compressed (.tgz) file with source code and Makefile

Your job is to write C++ code that does the following:

- Takes a filename as a command line argument, e.g.,
  - UNIX> ./hw1 input.txt

- The input file will be of any length, with each line containing the following items separated by whitespace:
  - name (character string)
  - age (integer)
  - weight (double)
  - height (double)

- For example, the first line of “input.txt”:
  - UNIX> head -n 1 input.txt

  Fred 50 200.8 69.6

- Your program will read the information from the input file into the proper data structures, then output the following:
  - A list of names in the same order as the input file.
  - A list of height: name pairs, sorted by height in increasing order
  - A list of weight: name pairs, sorted by weight in increasing order
  - A list of age: name pairs, sorted by age in decreasing order
  - Before each list is printed, have your program output the list type. (I.e., “order”, “height”, “weight”, and “age”).
    - See the next page for examples.

- Your program must error-check the following items. If an error is found, your program must display a useful error message to stderr and exit gracefully.
  - Valid command line argument
  - File opened correctly
  - age is greater than 0
  - weight is greater than 0
  - height is greater than 0

- Your program must free all memory used before exiting
- Your program must close the input file before exiting
- You must use C-style strings (i.e., char *). You cannot use C++ string objects.
- You cannot use a C++ class or C++ filestreams objects.
- Hints:
  - struct
  - FILE *; fopen(); fclose(), fprintf(), fscanf(), malloc(), free(), strdup()
  - C++ vector and map data structures (standard template library)
Examples:

UNIX> cat input.txt
Fred 50 200.8 69.6
Mary 20 150.2 63.4
Tim 35 175.2 61.9

UNIX> ./hw1 input.txt
==== order ====
Fred
Mary
Tim
==== height ====
61.900: Tim
63.400: Mary
69.600: Fred
==== weight ====
150.200: Mary
175.200: Tim
200.800: Fred
==== age ====
50: Fred
35: Tim
20: Mary

UNIX> ./hw1
usage: ./hw1 input_file

UNIX> ./hw1 non_existent_input_file.txt
ERROR: could not open file

UNIX> cat bad_age_input.txt
Marc -10 100.7 200.4

UNIX> ./hw1 bad_age_input.txt
ERROR: Marc's age must be non-negative

UNIX> cat bad_weight_input.txt
Marc 10 -100.7 200.4

UNIX> ./hw1 bad_weight_input.txt
ERROR: Marc's weight must be non-negative