

## test for mapset.cpp

```
zeng — zhaohuaz@mannfred-uta:~/Homework/hw8 — ssh zhaohuaz@openlab.ics.uci.edu — 140x85
zhaohuaz@mannfred-uta 21:45:41 ~/Homework/hw8
$ g++ -std=c++11 mapset.cpp -o test1
zhaohuaz@mannfred-uta 21:46:03 ~/Homework/hw8
$ ./test1
AD: 1
ADD: 1
ActionScript: 1
Ada: 1
AdaCore: 1
Air: 1
Al-Jazari: 1
Although: 1
Analytical: 2
Ancient: 1
Another: 1
Antikythera: 1
BC: 2
Babbage: 1
Basic: 1
Bernoulli: 1
C: 3
COBOL: 1
Charles: 1
China: 1
Company: 1
Computer: 2
Different: 1
Due: 1
Early: 1
Engine: 2
Entering: 1
Europe: 1
Every: 1
FORTRAN: 3
Force: 1
Formula: 1
Greece: 1
Haskell: 1
Herman: 1
Hollerith: 2
However: 2
I: 1
IBM: 3
India: 1
Jacquard: 3
Japan: 1
Java: 1
JavaScript: 1
Joseph: 1
Kurdish: 1
Later: 2
Lovelace: 1
Machine: 1
Many: 1
Marie: 1
Mathematician: 1
Neumann: 1
Objective-C: 1
Olympiads: 1
One: 1
PHP: 1
Perl: 1
Popular: 1
Prior: 1
Programming: 1
Programs: 1
Python: 1
Related: 1
Ruby: 1
SQL: 1
SapirWhorf: 1
See: 1
Smalltalk: 1
Software: 1
Source: 1
States: 2
Sumeria: 1
TOTAL: 1
Tabulation: 1
```

Tabulating: 1  
Tabulator: 1  
Text: 1  
Translation: 1  
Type: 1  
United: 2  
Usually: 1

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Type: 1  
United: 2  
Usually: 1  
Visual: 1  
Within: 1  
X: 3  
Y: 1  
abacus: 1  
abbreviations: 1  
abstract: 2  
abstracted: 2  
abstraction: 1  
accredited: 1  
acknowledges: 1  
act: 1  
action: 1  
activities: 1  
actual: 1  
adaptations: 1  
addition: 1  
addresses: 1  
adopted: 1  
affects: 1  
algebra: 1  
algorithms: 4  
allow: 1  
allowed: 5  
allows: 1  
along: 1  
also: 2  
analogous: 1  
analysis: 1  
ancient: 1  
application: 2  
applications: 2  
architecture: 1  
areas: 2  
arithmetic: 1  
around: 2  
art: 1  
artifacts: 1  
assembly: 6  
automata: 1  
automate: 1  
became: 2  
become: 1  
becoming: 1  
beginning: 1  
besides: 1  
beyond: 2  
binary: 1  
build: 1  
building: 1  
built: 1  
calculate: 1  
calculating: 1  
calculation: 1  
calculations: 2  
calculator: 1  
calculators: 1  
calculus: 1  
calendars: 1  
call: 1  
called: 1  
cams: 1  
card: 3  
cards: 8  
career: 2  
cases: 1  
certification: 1  
challenges: 1  
changes: 1  
circa: 1  
clearance: 1  
cloth: 1  
code: 6  
coding: 2

cognitive: 1  
combines: 1  
commercial: 1  
commonly: 1  
community: 1  
compiler: 1  
complicated: 1  
computation: 1

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computation: 1  
computational: 1  
compute: 1  
computer: 9  
computers: 3  
computing: 2  
conceive: 1  
conception: 1  
condition: 1  
configuration: 1  
considerably: 1  
considered: 2  
consistent: 1  
consumption: 1  
control: 4  
convenient: 1  
converted: 1  
core: 1  
corrections: 1  
correctness: 1  
cost: 1  
could: 5  
countries: 3  
covers: 1  
craft: 1  
crafted: 1  
created: 1  
criteria: 1  
critical: 1  
cultures: 1  
cycle: 1  
data: 4  
dates: 1  
debatable: 1  
debate: 3  
debugging: 1  
decisions: 1  
defined: 1  
derived: 1  
design: 1  
develop: 1  
developed: 7  
developing: 1  
development: 5  
device: 2  
devices: 2  
devising: 1  
different: 9  
differs: 1  
directly: 2  
discarded: 1  
discipline: 4  
domain: 1  
dozens: 1  
drive: 1  
drum: 2  
drummer: 1  
easier: 1  
easily: 1  
easy: 1  
economic: 1  
editors: 1  
efficient: 2  
efficiently: 1  
eg: 4  
elementary: 1  
elements: 1  
employed: 1  
engine: 3  
engineer: 1  
engineering: 4  
engineers: 1  
enough: 1  
entered: 1  
entering: 2

entirely: 1  
entities: 1  
environments: 1  
era: 2  
error: 2  
even: 1  
evolvable: 2  
executable: 1  
exhaustion: 1  
existed: 1

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existed: 1  
expertise: 1  
expressed: 1  
extent: 2  
fact: 1  
faster: 1  
final: 1  
find: 1  
first: 4  
follow: 1  
form: 3  
formal: 1  
format: 1  
forms: 1  
formula: 1  
formulation: 1  
found: 1  
foundation: 2  
founded: 1  
functional: 1  
fundamental: 1  
gears: 1  
general: 3  
generating: 1  
geometry: 1  
giant: 1  
given: 1  
goal: 1  
good: 1  
governmentally: 1  
greater: 1  
habitual: 1  
hardware: 2  
high: 2  
high-level: 3  
higher: 1  
history: 1  
hole: 1  
holes: 1  
human: 2  
humans: 1  
hypothesis: 1  
idea: 1  
ie: 1  
illegal: 1  
implementation: 5  
importing: 1  
impractical: 1  
include: 3  
including: 3  
increase: 1  
increasing: 1  
increasingly: 2  
incur: 1  
industry: 1  
inexpensive: 1  
influences: 1  
initial: 1  
input: 1  
instead: 1  
institution: 1  
instruction: 2  
instructions: 7  
instruments: 2  
intent: 1  
invented: 5  
invention: 1  
inventions: 1  
involves: 1  
jobs: 1  
keypunch: 1  
knowledge: 1  
known: 2

labor: 1  
language: 16  
languages: 11  
larger: 1  
late: 2  
later: 1  
leads: 1  
leaps: 1  
learn: 1  
led: 1  
less: 3  
let: 1

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existed: 1  
expertise: 1  
expressed: 1  
extent: 2  
fact: 1  
faster: 1  
final: 1  
find: 1  
first: 4  
follow: 1  
form: 3  
formal: 1  
format: 1  
forms: 1  
formula: 1  
formulation: 1  
found: 1  
foundation: 2  
founded: 1  
functional: 1  
fundamental: 1  
gears: 1  
general: 3  
generating: 1  
geometry: 1  
giant: 1  
given: 1  
goal: 1  
good: 1  
governmentally: 1  
greater: 1  
habitual: 1  
hardware: 2  
high: 2  
high-level: 3  
higher: 1  
history: 1  
hole: 1  
holes: 1  
human: 2  
humans: 1  
hypothesis: 1  
idea: 1  
ie: 1  
illegal: 1  
implementation: 5  
importing: 1  
impractical: 1  
include: 3  
including: 3  
increase: 1  
increasing: 1  
increasingly: 2  
incur: 1  
industry: 1  
inexpensive: 1  
influences: 1  
initial: 1  
input: 1  
instead: 1  
institution: 1  
instruction: 2  
instructions: 7  
instruments: 2  
intent: 1  
invented: 5  
invention: 1  
inventions: 1  
involves: 1  
jobs: 1  
keypunch: 1

knowledge: 1  
known: 2  
labor: 1  
language: 16  
languages: 11  
larger: 1  
late: 2  
later: 1  
leads: 1  
leaps: 1  
learn: 1  
led: 1  
less: 3  
let: 1

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```
let: 1
level: 2
levers: 1
license: 1
licensed: 1
licensing: 1
likely: 1
linguistics: 1
list: 1
lists: 1
little: 1
locations: 1
logic: 1
loom: 3
looms: 1
low-level: 1
lower: 1
lunar-to-solar: 1
machine: 9
machines: 4
made: 3
maintaining: 1
making: 1
management: 1
manner: 1
many: 4
maximum: 1
may: 2
meant: 1
measured: 1
mechanical: 2
mechanism: 2
mechanisms: 1
mechanized: 1
media: 1
medieval: 1
medium: 1
memory: 1
method: 1
metonic: 1
might: 2
model: 1
modern: 4
mostly: 1
much: 3
musical: 1
mutual: 1
name: 1
nature: 1
necessary: 1
need: 1
new: 1
notation: 3
number: 2
numbers: 2
numerical: 2
objects: 1
occasionally: 1
often: 4
one: 3
oneself: 1
ongoing: 2
operated: 1
operating: 1
operation: 2
operations: 3
opportunities: 1
opposed: 1
order: 1
organize: 1
```

organized: 1  
original: 2  
output: 2  
outsourcing: 1  
overhead: 1  
painstakingly: 1  
panel: 1  
panels: 1  
paper: 3  
part: 1  
particular: 2  
particularly: 2  
parts: 1  
pass: 1  
past: 1  
pasteboard: 1

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pasteboard: 1  
pattern: 2  
patterns: 3  
pegs: 1  
percussion: 1  
perfectly: 1  
perform: 1  
performing: 1  
phase: 1  
physically: 1  
placed: 1  
playing: 1  
plugboard: 1  
popular: 1  
possibility: 1  
postulates: 1  
power: 1  
practical: 1  
practices: 1  
predetermined: 1  
problem: 2  
process: 6  
processing: 3  
produce: 2  
producing: 1  
profession: 1  
professional: 1  
professions: 1  
program: 6  
programmable: 2  
programmed: 1  
programmer: 4  
programmers: 5  
programming: 23  
programs: 9  
progressed: 1  
prone: 1  
punch: 1  
punched: 7  
punching: 1  
purpose: 1  
read: 1  
readable: 1  
rebuilt: 1  
record: 2  
recording: 1  
referred: 1  
regarded: 1  
regulated: 1  
relations: 1  
relatively: 1  
replace: 1  
represented: 1  
representing: 2  
require: 1  
required: 1  
requirements: 1  
requires: 1  
reserved: 1  
resources: 1  
rhythms: 1  
science: 2  
scientist: 1  
security: 1  
seemed: 1  
self-governed: 1  
sequence: 3  
sequentially: 1

```
series: 1
services: 1
sets: 2
settled: 1
several: 1
shortened: 1
sizes: 1
small: 1
software: 8
solution: 1
solving: 1
sometimes: 1
sorter: 1
source: 4
speaker: 1
speakers: 1
special: 1
```

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```
special: 1
specialized: 1
specific: 2
specified: 1
specify: 2
specifying: 1
speed: 2
spoken: 1
standardized: 1
stands: 1
still: 3
storage: 1
stored: 1
strict: 1
subject: 1
subjects: 1
surrounding: 1
susceptible: 1
symbolic: 1
symbols: 1
synthesis: 1
system: 2
systems: 1
tabulator: 1
takes: 1
tape: 2
target: 1
task: 2
tasks: 1
technical: 1
techniques: 1
term: 2
terminals: 1
terms: 2
testing: 1
tests: 1
text: 2
theorized: 1
things: 1
thought: 2
thoughts: 1
three: 1
thus: 2
time: 2
tracked: 1
translates: 1
trials: 1
trigger: 1
turn: 1
two: 1
typically: 1
typing: 1
underlying: 1
understanding: 1
unit: 2
upon: 1
use: 5
used: 3
uses: 2
using: 5
usually: 3
utilizing: 1
various: 2
vary: 1
verification: 1
vital: 1
```



```
von: 1
wage: 1
way: 1
weaves: 1
weaving: 1
well: 1
whether: 1
whole: 1
whose: 2
widely-used: 1
without: 2
wooden: 1
world: 3
worlds: 1
would: 2
write: 1
writing: 3
written: 1
wrote: 1
```

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```
wrote: 1
yield: 1
```

zhaohuaz@mannfred-uta 21:46:07 ~/Homework/hw8

```
$ cat frequency.txt
```

```
AD: 1
ADD: 1
ActionScript: 1
Ada: 1
AdaCore: 1
Air: 1
Al-Jazari: 1
Although: 1
Analytical: 2
Ancient: 1
Another: 1
Antikythera: 1
BC: 2
Babbage: 1
Basic: 1
Bernoulli: 1
C: 3
COBOL: 1
Charles: 1
China: 1
Company: 1
Computer: 2
Different: 1
Due: 1
Early: 1
Engine: 2
Entering: 1
Europe: 1
Every: 1
FORTRAN: 3
Force: 1
Formula: 1
Greece: 1
Haskell: 1
Herman: 1
Hollerith: 2
However: 2
I: 1
IBM: 3
India: 1
Jacquard: 3
Japan: 1
Java: 1
JavaScript: 1
Joseph: 1
Kurdish: 1
Later: 2
Lovelace: 1
Machine: 1
Many: 1
Marie: 1
Mathematician: 1
Neumann: 1
Objective-C: 1
Olympiads: 1
One: 1
PHP: 1
Perl: 1
Popular: 1
Prior: 1
```

Programming: 1  
Programs: 1  
Python: 1  
Related: 1  
Ruby: 1  
SQL: 1  
SapirWhorf: 1  
See: 1  
Smalltalk: 1  
Software: 1  
Source: 1  
States: 2  
Sumeria: 1  
TOTAL: 1  
Tabulating: 1  
Tabulator: 1  
Text: 1  
Translation: 1  
Type: 1  
United: 2

zeng — zhaohuaz@mannfred-uta:~/Homework/hw8 — ssh zhaohuaz@openlab.ics.uci.edu — 140x85

United: 2  
Usually: 1  
Visual: 1  
Within: 1  
X: 3  
Y: 1  
abacus: 1  
abbreviations: 1  
abstract: 2  
abstracted: 2  
abstraction: 1  
accredited: 1  
acknowledges: 1  
act: 1  
action: 1  
activities: 1  
actual: 1  
adaptations: 1  
addition: 1  
addresses: 1  
adopted: 1  
affects: 1  
algebra: 1  
algorithms: 4  
allow: 1  
allowed: 5  
allows: 1  
along: 1  
also: 2  
analogous: 1  
analysis: 1  
ancient: 1  
application: 2  
applications: 2  
architecture: 1  
areas: 2  
arithmetic: 1  
around: 2  
art: 1  
artifacts: 1  
assembly: 6  
automata: 1  
automate: 1  
became: 2  
become: 1  
becoming: 1  
beginning: 1  
besides: 1  
beyond: 2  
binary: 1  
build: 1  
building: 1  
built: 1  
calculate: 1  
calculating: 1  
calculation: 1  
calculations: 2  
calculator: 1  
calculators: 1  
calculus: 1  
calendars: 1  
call: 1  
called: 1  
cams: 1

card: 3  
cards: 8  
career: 2  
cases: 1  
certification: 1  
challenges: 1  
changes: 1  
circa: 1  
clearance: 1  
cloth: 1  
code: 6  
coding: 2  
cognitive: 1  
combines: 1  
commercial: 1  
commonly: 1  
community: 1  
compiler: 1  
complicated: 1  
computation: 1  
computational: 1

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computational: 1  
compute: 1  
computer: 9  
computers: 3  
computing: 2  
conceive: 1  
conception: 1  
condition: 1  
configuration: 1  
considerably: 1  
considered: 2  
consistent: 1  
consumption: 1  
control: 4  
convenient: 1  
converted: 1  
core: 1  
corrections: 1  
correctness: 1  
cost: 1  
could: 5  
countries: 3  
covers: 1  
craft: 1  
crafted: 1  
created: 1  
criteria: 1  
critical: 1  
cultures: 1  
cycle: 1  
data: 4  
dates: 1  
debatable: 1  
debate: 3  
debugging: 1  
decisions: 1  
defined: 1  
derived: 1  
design: 1  
develop: 1  
developed: 7  
developing: 1  
development: 5  
device: 2  
devices: 2  
devising: 1  
different: 9  
differs: 1  
directly: 2  
discarded: 1  
discipline: 4  
domain: 1  
dozens: 1  
drive: 1  
drum: 2  
drummer: 1  
easier: 1  
easily: 1  
easy: 1  
economic: 1  
editors: 1  
efficient: 2

efficiently: 1  
eg: 4  
elementary: 1  
elements: 1  
employed: 1  
engine: 3  
engineer: 1  
engineering: 4  
engineers: 1  
enough: 1  
entered: 1  
entering: 2  
entirely: 1  
entities: 1  
environments: 1  
era: 2  
error: 2  
even: 1  
evolvable: 2  
executable: 1  
exhaustion: 1  
existed: 1  
expertise: 1

zeng — zhaohuaz@mannfred-uta:~/Homework/hw8 — ssh zhaohuaz@openlab.ics.uci.edu — 140x85

expertise: 1  
expressed: 1  
extent: 2  
fact: 1  
faster: 1  
final: 1  
find: 1  
first: 4  
follow: 1  
form: 3  
formal: 1  
format: 1  
forms: 1  
formula: 1  
formulation: 1  
found: 1  
foundation: 2  
founded: 1  
functional: 1  
fundamental: 1  
gears: 1  
general: 3  
generating: 1  
geometry: 1  
giant: 1  
given: 1  
goal: 1  
good: 1  
governmentally: 1  
greater: 1  
habitual: 1  
hardware: 2  
high: 2  
high-level: 3  
higher: 1  
history: 1  
hole: 1  
holes: 1  
human: 2  
humans: 1  
hypothesis: 1  
idea: 1  
ie: 1  
illegal: 1  
implementation: 5  
importing: 1  
impractical: 1  
include: 3  
including: 3  
increase: 1  
increasing: 1  
increasingly: 2  
incur: 1  
industry: 1  
inexpensive: 1  
influences: 1  
initial: 1  
input: 1  
instead: 1  
institution: 1  
institution: 2

instruction: 2  
instructions: 7  
instruments: 2  
intent: 1  
invented: 5  
invention: 1  
inventions: 1  
involves: 1  
jobs: 1  
keypunch: 1  
knowledge: 1  
known: 2  
labor: 1  
language: 16  
languages: 11  
larger: 1  
late: 2  
later: 1  
leads: 1  
leaps: 1  
learn: 1  
led: 1  
less: 3  
let: 1  
level: 2

zeng — zhaohuaz@mannfred-uta:~/Homework/hw8 — ssh zhaohuaz@openlab.ics.uci.edu — 140×85

level: 2  
levers: 1  
license: 1  
licensed: 1  
licensing: 1  
likely: 1  
linguistics: 1  
list: 1  
lists: 1  
little: 1  
locations: 1  
logic: 1  
loom: 3  
looms: 1  
low-level: 1  
lower: 1  
lunar-to-solar: 1  
machine: 9  
machines: 4  
made: 3  
maintaining: 1  
making: 1  
management: 1  
manner: 1  
many: 4  
maximum: 1  
may: 2  
meant: 1  
measured: 1  
mechanical: 2  
mechanism: 2  
mechanisms: 1  
mechanized: 1  
media: 1  
medieval: 1  
medium: 1  
memory: 1  
method: 1  
metonic: 1  
might: 2  
model: 1  
modern: 4  
mostly: 1  
much: 3  
musical: 1  
mutual: 1  
name: 1  
nature: 1  
necessary: 1  
need: 1  
new: 1  
notation: 3  
number: 2  
numbers: 2  
numerical: 2  
objects: 1  
occasionally: 1  
often: 4  
one: 3

oneself: 1  
ongoing: 2  
operated: 1  
operating: 1  
operation: 2  
operations: 3  
opportunities: 1  
opposed: 1  
order: 1  
organize: 1  
original: 2  
output: 2  
outsourcing: 1  
overhead: 1  
painstakingly: 1  
panel: 1  
panels: 1  
paper: 3  
part: 1  
particular: 2  
particularly: 2  
parts: 1  
pass: 1  
past: 1  
pasteboard: 1  
pattern: 2

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pattern: 2  
patterns: 3  
pegs: 1  
percussion: 1  
perfectly: 1  
perform: 1  
performing: 1  
phase: 1  
physically: 1  
placed: 1  
playing: 1  
plugboard: 1  
popular: 1  
possibility: 1  
postulates: 1  
power: 1  
practical: 1  
practices: 1  
predetermined: 1  
problem: 2  
process: 6  
processing: 3  
produce: 2  
producing: 1  
profession: 1  
professional: 1  
professions: 1  
program: 6  
programmable: 2  
programmed: 1  
programmer: 4  
programmers: 5  
programming: 23  
programs: 9  
progressed: 1  
prone: 1  
punch: 1  
punched: 7  
punching: 1  
purpose: 1  
read: 1  
readable: 1  
rebuilt: 1  
record: 2  
recording: 1  
referred: 1  
regarded: 1  
regulated: 1  
relations: 1  
relatively: 1  
replace: 1  
represented: 1  
representing: 2  
require: 1  
required: 1  
requirements: 1  
requires: 1  
reserved: 1

```
resources: 1
rhythms: 1
science: 2
scientist: 1
security: 1
seemed: 1
self-governed: 1
sequence: 3
sequentially: 1
series: 1
services: 1
sets: 2
settled: 1
several: 1
shortened: 1
sizes: 1
small: 1
software: 8
solution: 1
solving: 1
sometimes: 1
sorter: 1
source: 4
speaker: 1
speakers: 1
special: 1
specialized: 1
```

zeng — zhaohuaz@mannfred-uta:~/Homework/hw8 — ssh zhaohuaz@openlab.ics.uci.edu — 140×85

```
specialized: 1
specific: 2
specified: 1
specify: 2
specifying: 1
speed: 2
spoken: 1
standardized: 1
stands: 1
still: 3
storage: 1
stored: 1
strict: 1
subject: 1
subjects: 1
surrounding: 1
susceptible: 1
symbolic: 1
symbols: 1
synthesis: 1
system: 2
systems: 1
tabulator: 1
takes: 1
tape: 2
target: 1
task: 2
tasks: 1
technical: 1
techniques: 1
term: 2
terminals: 1
terms: 2
testing: 1
tests: 1
text: 2
theorized: 1
things: 1
thought: 2
thoughts: 1
three: 1
thus: 2
time: 2
tracked: 1
translates: 1
trials: 1
trigger: 1
turn: 1
two: 1
typically: 1
typing: 1
underlying: 1
understanding: 1
unit: 2
upon: 1
use: 5
```

```
used: 3
uses: 2
using: 5
usually: 3
utilizing: 1
various: 2
vary: 1
verification: 1
vital: 1
von: 1
wage: 1
way: 1
weaves: 1
weaving: 1
well: 1
whether: 1
whole: 1
whose: 2
widely-used: 1
without: 2
wooden: 1
world: 3
worlds: 1
would: 2
write: 1
writing: 3
written: 1
wrote: 1
yield: 1
```

test for multiset.cpp

```
zeng — zhaohuaz@mannfred-uta:~/Homework/hw8 — ssh zhaohuaz@openlab.ic...
.DS_Store mapset.cpp multiset.cpp~ rand_numbers.txt stopwords.txt
even.txt multiset.cpp odd.txt sample_doc.txt test2*
zhaohuaz@mannfred-uta 21:41:25 ~/Homework/hw8
[$ cat odd.txt
-99 -97 -95 -93 -91 -89 -87 -85 -83 -81 -79 -77 -75 -73 -71 -69 -67 -65 -63 -61
-59 -57 -55 -53 -51 -49 -47 -45 -43 -41 -39 -37 -35 -33 -31 -29 -27 -25 -23 -21
-19 -17 -15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33
35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 8
7 89 91 93 95 97 99 zhaohuaz@mannfred-uta 21:41:31 ~/Homework/hw8
[$ cat even.txt
-98 -96 -94 -92 -90 -88 -86 -84 -82 -80 -78 -76 -74 -72 -70 -68 -66 -64 -62 -60
-58 -56 -54 -52 -50 -48 -46 -44 -42 -40 -38 -36 -34 -32 -30 -28 -26 -24 -22 -20
-18 -16 -14 -12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34
36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 8
8 90 92 94 96 98 100 zhaohuaz@mannfred-uta 21:45:24 ~/Homework/hw8
$
```