Practice 7

Problem 1: Basic File Output

- Write a program that generates 10 by 10 random integer (0 ~ 100) matrix and saves the matrix into a new file.
- Numbers in each row are separated by a white space, and rows are separated by a new line character.
- Example output file

10

```
34 24 95 … 29 80 38
3 98 93 … 87 71 88
…
93 48 7 … 59 28 34
```

10

Problem 2: Basic File Input

- Write a program that reads the random matrix file generated in Problem 1 and calculates the average of each row and total average.
- Display the result in the monitor as

```
Average of row 1: 34.7837
Average of row 2: 68.3834
Average of row 3: 40.2892
…
Average of row 10: 48.3847

Total average: 54.2324
```

Problem 3: Shifting Lines in File

- Write a program to copy a file, inserting two space characters at the beginning of each line. In other words, each line will be shifted two characters to the right.
- For example, the input file

```
On its 60th anniversary in 2009, Kyung
Hee University prepared for a second leap
forward while seeking a new paradigm of
future university development.
```

is converted to the output file

```
  On its 60th anniversary in 2009, Kyung
  Hee University prepared for a second leap
  forward while seeking a new paradigm of
  future university development.
```

Two space characters

- Use the following text as an input file

Since its founding, Kyung Hee University has pursued the Kyung Hee Spirit of "Scholarship and Peace" as well as the founding principle of "creating a civilized world." For the past 62 years, the University has developed remarkably, contributing to the fulfillment of a "cultural world for humanity" as the leader of the future of academics and the creator of common values for humanity. In particular, the past five years have witnessed notable growth and a rise in the University's stature through forward-looking and adventurous endeavors in education, research, public service, and praxis.

On its 60th anniversary in 2009, Kyung Hee University prepared for a second leap forward while seeking a new paradigm of future university development. It reflected on the fundamental mission of the University and established a new vision and goals for becoming a true university of the future. In this new vision for a university that transcends the traditional notion of the university as a mere physical location and the limitations of an exclusive academe, Kyung Hee University will rise to international prestige and develop into an international center of research, education, and praxis that brings together reality and imagination, the basics and applied sciences, and theory and practice. Pursuing "Global Eminence" on a foundation of academic excellence, Kyung Hee University will become an academic community that fulfills its social responsibility by cultivating world citizens with the capacity for communication and public service.

Problem 4: Merging Two Files

- Write a program to merge two text files.
- For example, two input files

```
On its 60th anniversary in 2009, Kyung
Hee University prepared for a second leap
forward while seeking a new paradigm of
future university development.
```

```
In this paper, we explore the feasibility of a
medical training system for breast tumor palpation
based on haptic augmented reality (AR) technology.
```

are merged into one output file

```
On its 60th anniversary in 2009, Kyung
Hee University prepared for a second leap
forward while seeking a new paradigm of
future university development.

In this paper, we explore the feasibility of a
medical training system for breast tumor palpation
based on haptic augmented reality (AR) technology.
```

- Use the text in problem 3 as a first file and the following text as a second file for the text inputs

In this paper, we explore the feasibility of a medical training system for breast tumor palpation based on haptic augmented reality (AR) technology. Haptic AR is an emerging research area in haptics and virtual reality (VR), which is concerned with augmenting the haptic properties of a real object by means of virtual haptic feedback. The AR-based tumor palpation system consists of a real breast sample and a haptic interface that renders virtual tumors inside the breast. Haptic stimuli for the breast deformation are produced by the real breast sample, and those for the virtual tumor are created by the haptic AR system using a contact dynamics model identified via real measurements. Evaluation results show that our system, although greatly simpler than conventional pure VR simulations, can create haptic stimuli comparable to real tumor responses and provide outstanding simulation realism even close to real cases. This work highlights the potential of haptic AR technology for contributing to novel medical simulators with significantly improved simplicity and realism.

Problem 5: Aligning Text

- Write a program that aligns a text file.
- The program reads a text file, aligns each line to a fix length, and saves the result to a new file.
- The fixed length should be set by user's input (cin).
- Example:

```
In this paper, we explore the feasibility of a
medical training system for breast tumor palpation based on haptic
augmented reality (AR) technology. Haptic AR is an emerging
research area in haptics and virtual reality
(VR), which is concerned
with augmenting the haptic
properties of a real object by means of virtual haptic
feedback. The AR-based tumor palpation system
consists of a real breast sample.
```

```
In this paper, we explore the feasi
bility of a medical training system
for breast tumor palpation based on
haptic augmented reality (AR) techn
ology. Haptic AR is an emerging res
earch area in haptics and virtual r
eality (VR), which is concerned wit
h augmenting the haptic properties
of a real object by means of virtua
l haptic feedback. The AR-based tum
or palpation system consists of a r
eal breast sample.
```

Problem 6: Salary Management

- Write a program to read an employee file and creates a payroll report.
- The employee file has the following form

Employee no.	Department	Pay rate	Exempt	Hours Worked
101	41	8.11	Y	49
722	32	7.22	N	40
1273	23	5.43	Y	39
2584	14	6.74	N	45

- The report should be displayed on the monitor and should contains the following data:
  - Employee number
  - Base pay (pay rate * hours worked)
  - Overtime pay (calculated only for nonexempt employees and employees who worked more than 40 hours. Overtime pay = (40 – hours worked) * (pay rate /2)
  - Total pay (base pay + overtime pay)