- 1.String is a null-terminated character array. And there are some operations they can do.: Finding length of operation. converting character of a string into upper/lower, Appending a string to another string, comparing two strings, Reversing a string, Extracting a substring from a string, inserting a string in the main string, pattern matching, deleting a substring from the main string, replacing a pattern with another pattern in a string.
- 2. Simply, a string is a sequence of characters. It has the memory addresses of individual characters and this characters is stored in the memory by ASCII code not the character itself.
- 3. We can read strings in three ways: using scanf function, using gets function, using getchar(),getch(), or getche() repeatedly. scanf function is the method we are familiar with. But scanf function is terminated when they meet a black space. So when we put a sentence that has a blank space, We cannot obtain desired result. As an alternative, there is gets() function. The gets() function can recognize strings containing spaces. And we can also use the getchar() function that repeatedly read a sequence of character array.
- 4. String can be displayed on the screen by using three ways: using printf() function, using puts() function, and using putchar() function. printf() function is the method we are familiar with. puts() function is a function that redeem the disadvantage of printf() function. And we can also use the putchar() function that repeatedly prints a sequence of single characters.

<width>-Specifies the maximum number of characters to read from stdin.
<modifiers>-Specifies the size of the data received.
<type>- Data type that you want to receive.
6. {A,B,C,D,{A,B},{B,C},{C,D},{A,B,C,D},{A,B,C,D}}

```
7.  pattern_matching(main , pattern : string) \\ while(main[i]!='\0') \\ \{ j=0,k=i; \\ while(main[k]==pattern[j]\&\&pattern[j]!='\0') \\ \{ \}
```

```
j++;
k++;
}
if(pattern[j]=='\0')flag=0;
i++:
}

if(flag==0)printf("pattern matched");
else printf("pattern not matched");
}
```

- 8. String arrays use two-dimensional arrays to store multiple strings. We can think of a string as one column.
- 9. If we have an array declared as char phonename[2][10]={"iphone", "samsung"}; it will be stored as

i	р	h	0	n	е	'\0'		
S	a	m	S	u	n	g	'\0'	

- 10. Name of string acts as a pointer to the string. Writing puts(array\_name) means passing the address of name[0].
- 11. me to Wor
- 12. 17
- 13. scanf function is the method we are familiar with. But scanf function is terminated when they meet a black space. So when we put a sentence that has a blank space, we cannot obtain desired result. As an alternative, there is gets() function. The gets() function can recognize strings containing spaces.
- 14. Because the getchar() function is a function that prints characters, a loop must be used to print a string.
- 15. gets() function can be used.
- 16. Because the putchar() function is a function that prints a character until it encounters a space character, it is used as a method of repeatedly printing each character by using a while loop.
- 17. Character refers to a single letter, number, asymbol, and so on that can be represented using a computer while String refers to a set of characters
- 18. String refers to a sequence of characters represented as a single data type. On the other hand, Character Array is a sequential collection of data type char.

Review Questions

```
1.
#include <stdio.h>
#include <string.h>
void change(char a[],int n);
int main()
```

```
{
        char str[20];
        int i=0;
        printf("Enter string\n");
        gets(str);
        change(str,strlen(str));
        puts(str);
}
void change(char a[],int n)
        char temp;
               temp=a[0];
               a[0]=a[n-1];
               a[n-1]=temp;
 C:₩WINDOWS₩system32₩cmd.exe
Enter string
mario
 oarim
 계속하려면 아무 키나 누르십시오 . . .
2.
#include <stdio.h>
int main()
        int num;
        char a[20];
        char b[20];
        char c[20];
        int i=0, j=0, k=0;
        printf("Enter first text ");
        gets(a);
        printf("Enter second text ");
        gets(b);
```

```
printf("Enter a 'n' ");
        scanf("%d",&num);
        while(i<num)</pre>
                c[j]=a[i];
                j++;
                į++;
        while(b[k]!='\setminus 0')
                c[j]=b[k];
                j++;
                k++;
        }
        c[j]='\setminus 0';
        puts(c);
}
 C:₩WINDOWS₩system32₩cmd.exe
Enter first text supermario
Enter second text galaxy
Enter a 'n' 5
superga axy
계속하려면 아무 키나 누르십시오 . . .
3.
#include <stdio.h>
int main()
        int num;
        char a[20];
        char b[20];
        char c[20];
        int flag=0;
        int i=0;
        printf("Enter first text ");
        gets(a);
        printf("Enter second text ");
        gets(b);
        printf("Enter a 'n' ");
```

```
scanf("%d",&num);
        while(i<num)</pre>
                if(a[i]==b[i])
                        flag=1;
                else
                        flag=0;
                į++;
       }
        if(flag==1)
                printf("It's same");
        else
                printf("It's not same");
 C:₩WINDOWS₩system32₩cmd.exe
Enter first text supermario
 Enter second text supergalaxy
Enter a 'n' 5
 t's same계속하려면 아무 키나 누르십시오 . . .
4.
#include <stdio.h>
int main()
{
        int num;
        char a[20];
        char b[20];
        char c[20];
       int flag=0;
        int i=0,j=0;
        printf("Enter text ");
        gets(a);
        while(a[i]!='\setminus 0')
                        if(a[i]!=' ')
                                        b[j]=a[i];
```

```
j++;
                                          i++;
                         else i++;
        b[j]='\setminus 0';
        puts(b);
 C:₩WINDOWS₩system32₩cmd.exe
Enter first text
                           mario
mario
계속하려면 아무 키나 누르십시오 . . .
#include <stdio.h>
int main()
{
        int num;
        char a[20];
        char ch,ch2;
        int i=0,flag=0;
        printf("Enter first text ");
        gets(a);
        printf("Enter character to replace in string \n");
        scanf(" %c",&ch);
        printf("Enter the character you want to change \n");
        scanf(" %c",&ch2);
        while(a[i]!='\setminus 0')
```

```
if(ch!=a[i])
                       j++;
               else
                       if(a[i]==ch)
                                      a[i]=ch2;
                                      į++;
       }
 C:₩WINDOWS₩system32₩cmd.exe
Enter first text mario
Enter character to replace in string
Enter the character you want to change
sario
계속하려면 아무 키나 누르십시오 . . .
#include <stdio.h>
int main()
       char a[10];
       int count_1=0,count_2=0,count_3=0,count_4=0;
       int i=0;
       printf("Enter string : ");
       gets(a);
       while(a[i]!='\setminus 0')
               if(a[i] > = 65 \&\& a[i] < = 90)
                       count_1++;
               if(a[i] > = 97 \&\& a[i] < = 122)
                      count_2++;
               if(a[i] > = 48 \&\& a[i] < = 57)
                   count_3++;
```

if((a[i] > 58 && a[i] < 64)||(a[i] > 91 && a[i] < 96))

6.

```
count_4++;

i++;
}

printf("number of upper case : %d\n",count_1);
printf("number of lower case : %d\n",count_2);
printf("number of digits : %d\n",count_3);
printf("number of special characters : %d\n",count_4);
```

```
}
 C:₩WINDOWS₩system32₩cmd.exe
Enter string : Mario3??
number of upper case : 1
number of lower case : 4
number of digits : 1
number of special characters : 2
계속하려면 아무 키나 누르십시오 .
7.
#include <stdio.h>
#include <string.h>
int main()
       char a[10],b[26];
       int count_1[50]={0};
       int i=0;
       int j=97;
       int k=122;
       printf("Enter string : ");
       gets(a);
```

for(i=0;i<26;i++)

b[i]=i+97;

for(i=0;i<strlen(a);i++)</pre>

```
{
                                                                                                                                                                                                                                                   for(j=0;j<26;j++)
                                                                                                                                                                                                                                                                                                                                                                            if(a[i]==b[j])
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  count_1[j]++;
                                                                                                                                                                                                                                                   }
                                                                                                                        }
                                                                                                                           for(i=0;i<26;i++)
                                                                                                                           {
                                                                                                                                                                                                                                                      printf("%c : %d\n",i+97,count_1[i]);
                                                                                                                        }
}
Enter string: supermario
a : 1
b : 0
c : 0
d : 0
e : 1
f : 0
g : 0
h : 0
m : 1
n : 0
c : 1
i : 0
c : 1
i : 0
i : 1
i : 0
i : 1
i : 0
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i :
```

```
char main[200],pattern[20],new_text[200];
        int i=0,j,k,x=0,q=0,n=0;
        int count=0;
        printf("Enter the main text : ");
        gets(main);
        printf("Pattern you want to find : ");
        gets(pattern);
        while(main[i]!='\0')
                         j=0,k=i;
                 while(main[k]==pattern[j]&&pattern[j]!='\0')
                          j++;
                          k++;
                 if(pattern[j]=='\0')
                          count++;
                          q=k;
                 new_text[x]=main[q];
                 χ++;
                 į++;
                 q++;
        }
                 new_text[x]='\setminus 0';
                 printf("%d",count);
 GSS C:₩WINDOWS₩system32₩cmd.exe
Enter the main text : he is the student of the kyonggi university
Pattern you want to find : the
2계속하려면 아무 키나 누르십시오
#include <stdio.h>
int main()
        char main[200],pattern[20],new_text[200];
```

#include <stdio.h>

int main()

```
int i=0,j,k,x=0,q=0,n=0;
        int count=0;
        printf("Enter the main text : ");
        gets(main);
        printf("the word you want to investigate in string : ");
        gets(pattern);
        while(main[i]!='\0')
                        j=0,k=i;
                while(main[k]==pattern[j]&&pattern[j]!='\0')
                        j++;
                        k++;
                }
                if(pattern[j]=='\0')
                        count++;
                        q=k;
                new_text[x]=main[q];
                X++;
                į++;
                q++;
        }
                new_text[x]='\setminus 0';
                printf("THe occurence of a word %s is %d",pattern,count);
C:₩WINDOWS₩system32₩cmd.exe
Enter the main text : he is 24 years old. he lives in seoul
the word you want to investigate in string : he
THe occurence of a word he is 2계속하려면 아무 키나 누르십시오 . . .
10.
#include <stdio.h>
int main()
        char a[30];
        char b[30];
        int pos;
        int i,j=0;
        printf("Enter the text : ");
        gets(a);
```

```
scanf("%d",&pos);
        i=pos;
        while(a[i]!='\setminus 0')
                b[j]=a[i];
                į++;
                j++;
        }
        b[j]='\setminus 0';
        printf("\n");
        puts(b);
}
 C:₩WINDOWS₩system32₩cmd.exe
Enter the text : supermario
Enter the position : 5
mario
계속하려면 아무 키나 누르십시오 .
11.
#include <stdio.h>
#include <string.h>
int main()
{
        char a[30]="happy birthday to you";
        char b[30]={0};
        int i,index_start,index_end,k=0,j;
        index_end=strlen(a);
        i=strlen(a)-1;
        for(i;i>=0;i--)
    {
                if(a[i] == ' ')
       {
           index_start = i + 1;
                        for(j=index_start;j<index_end;j++)</pre>
                                {
                                        b[k]=a[j];
                                        k++;
```

printf("Enter the position : ");

```
}
           b[k]= ' ';
           k++;
          index_end = i;
       }
   }
        for(i=0;i<=index_end;i++)</pre>
        {
                b[k]=a[i];
                k++;
        }
   puts(b);
  M C:₩WINDOWS₩system32₩cmd.exe
                        ·키나 누르십시오 . . .
12.
#include <stdio.h>
#include <string.h>
int main()
{
        char given[30]="GOOD MORNING MORNING GOOD";
        char input[10];
        char new_format[50];
        int i=0,j=0,k=0;
        int temp;
        temp=((strlen(given)-1)/2);
        gets(input);
        while(given[i]!='\0')
        {
                if(i==temp)
                        while(input[k]!='\0')
                                 new_format[j]=input[k];
                                 k++;
                                 j++;
                        break;
```

```
}
                  new_format[j]=given[i];
                          i++;
                          j++;
        }
         while(given[i]!='\0')
                  new_format[j]=given[i];
                           į++;
                          j++;
        }
         new_format[j]='\0';
         puts(new_format);
 C:₩WINDOWS₩system32₩cmd.exe
GOOD MORNING mario MORNING GOOD
계속하려면 아무 키나 누르십시오
13.
#include <stdio.h>
#include <string.h>
int main()
         char a[3000];
         char b[3000];
        int loc[20];
        int i=0,j=0,k=0;
         printf("Enter the text\n");
         while(a[i]!='\setminus 0')
         {
                  scanf("%c",&a[i]);
                  if(a[i]=='\n'\&\&a[i-1]=='\n')
                                   loc[j]=i;
                                   j++;
```

```
if(a[i]=='*')
            break;
        i++:
   a[i]='\setminus 0';
   i=0,j=0;
   for(i=loc[0]+1;i<strlen(a);i++)</pre>
        {
            b[j]=a[i];
            j++;
   for(i=0;i<2;i++)
        b[j]='\n';
        j++;
   for(i=0;i<loc[0]-1;i++)</pre>
        b[j]=a[i];
        j++;
   b[j]='\setminus 0';
   printf("\n");
   printf("result\n");
   puts(b);
C:\WINDOWS\system32\cmd.exe
```

```
#include <stdio.h>
#include <string.h>
int main()
       char a[2000];
       int loc[3];
       int i=0,j=1;
       int count=0;
       printf("Write text");
       while(a[i]!='\setminus 0')
               scanf("%c",&a[i]);
               if(a[i]=='\n'\&\&a[i-1]=='\n')
                              loc[j]=i;
                             j++;
                              count++;
               if(a[i]=='*')
                      break;
               į++;
       a[i]='\setminus 0';
       loc[0]=1;
       for(i=0;i<j;i++)</pre>
              if(i==0)
               printf("The location of %d paragraph is %d\n",i+1,loc[i]);
               printf("The location of %d paragraph is %d\n",i+1,loc[i]+1);

    C:₩WINDOWS₩system32₩cmd.exe
```

```
15.
#include <stdio.h>
int main ()
        char a[30];
        int i=0;
        printf("Enter the string\n");
        gets(a);
        while(a[i]!='\setminus 0')
                if(a[i] > = 65 \&\& a[i] < = 90)
                         a[i]=a[i]+32;
                j++;
        puts(a);
 C:₩WINDOWS₩system32₩cmd.exe
GOOD MORNING
   속하려면 아무 키나 누르십시오 . . .
16. PROGRAMMING EXAMPLES 3(page 121)
17.
#include <stdio.h>
#include <string.h>
int main()
        char a[30],b[30];
        printf("Enter the first text\n");
        gets(a);
        printf("Enter the second text\n");
        gets(b);
        if(strcmp(a,b)==0)
                printf("It's same");
        else
                printf("It's not same");
}
```

### C:₩WINDOWS₩system32₩cmd.exe

```
Enter the first text
Good Morning
Enter the second text
GOOD MORNING
It's not same계속하려면 아무 키나 누르십시오 . . .

18. PROGRAMMING EXAMPLE 5 (page 123)
19. PROGRAMMING EXAMPLE 6 (page 124)
20.
#include <stdio.h>
#include <string.h>
```

```
int main()
         char given[30]="OXford Press";
         char input[15];
         char new_format[50];
         int i=0,j=0,k=0;
         int temp;
         temp=strlen(given)/2;
         gets(input);
         while(given[i]!='\0')
                  if(i==temp)
                           while(input[k]!='\0')
                                    new_format[j]=input[k];
                                    k++;
                                    j++;
                           break;
                  }
                  new_format[j]=given[i];
                           į++;
                           j++;
        }
         while(given[i]!='\0')
```

```
new_format[j]=given[i];
                           i++;
                           j++;
         }
         new_format[j]='\0';
         puts(new_format);
 GS. C:₩WINDOWS₩system32₩cmd.exe
 university
OXford university Press
계속하려면 아무 키나 누르십시오 . . .
21.
#include <stdio.h>
#include <string.h>
int main()
         char a[30],b[30];
         int i=0,j=0;
         printf("Enter the first text\n");
         gets(a);
         while(a[i]!='\setminus 0')
                  if(a[i]!=';')
                                    b[j]=a[i];
                                    j++;
                  į++;
         b[j]='\setminus 0';
         j=0;
         while(b[j]!='\setminus 0')
                  if(b[j]=='.')
                           b[j]=',';
```

```
}
        puts(b);
}
 C:₩WINDOWS₩system32₩cmd.exe
Enter the first text
    ..is..a;;;car
      ,is,,acar
      하려면 아무 키나 누르십시오 . . .
22.
#include <stdio.h>
#include <string.h>
int main()
{
        char a[20];
        char b[20];
        int pos;
        int i=0,j=0;
        printf("Enter the string : ");
        gets(a);
        printf("Enter n");
        scanf("%d",&pos);
        for(i=strlen(a)-3;i<strlen(a);i++)</pre>
                        if(a[i] >= 97\&\&a[i] <= 122)
                                a[i]=a[i]-32;
                        b[j]=a[i];
                        j++;
        b[j]='\setminus 0';
        j=();
        puts(b);
}
```

j++;

## C:₩WINDOWS₩system32₩cmd.exe

```
Enter the string : supermario
Enter n3
RI0
계속하려면 아무 키나 누르십시오 . . .
23.
#include <stdio.h>
int main()
{
        char main[200],pattern[20],replace[20],new_text[200];
        int i=0,j,k,x=0,q=0,n=0;
        printf("Enter the main text : ");
        gets(main);
        printf("Enter the pattern to be replaced : ");
        gets(pattern);
        printf("Enter the replacing pattern ");
        gets(replace);
        while(main[i]!='\0')
                        j=0,k=i;
                while(main[k]==pattern[j]&&pattern[j]!='\0')
                {
                        j++;
                        k++;
                if(pattern[j]=='\setminus 0')
                        q=k;
                        while(replace[n]!='\0')
                                 new_text[x]=replace[n];
                                 χ++;
                                 n++;
                new_text[x]=main[q];
                X++;
                i++;
                q++;
        }
```

 $new_text[x]='\setminus 0';$ 

```
puts(new_text);
}
 C:₩WINDOWS₩system32₩cmd.exe
Enter the main text : GOOD MORNING
Enter the pattern to be replaced: MORNING
Enter the replacing pattern evening
GOOD evening
계속하려면 아무 키나 누르십시오 . . .
24.
#include <stdio.h>
int main()
      char a[5][10];
      int num,i;
      printf("Enter the number of employees");
      scanf("%d",&num);
      fflush(stdin);
      for(i=0;i<num;i++)</pre>
             printf("\nEnter the name of employee %d: ",i+1);
             gets(a[i]);
      printf("\n");
      printf("The name of employee\n");
      for(i=0;i<num;i++)</pre>
             puts(a[i]);
       the number of employees
Enter the name of employee 1: cox
Enter the name of employee 2: yumi
Enter the name of employee 3: billy
Enter the name of employee 4: amy
Enter the name of employee 5: homi
```

The name of employee

```
25.
#include <stdio.h>
 int main() {
  char a[100];
  int i=0;
  printf("Enter a string ");
   gets(a);
  while(a[i]!='\setminus 0')
  {
          if(a[i]=='\n')
                  break;
          į++;
  }
 puts(a);
 c:₩WINDOWS₩system32₩cmd.exe
Enter a string mario
mario
계속하려면 아무 키나 누르십시오 . . .
26.
#include <stdio.h>
#include <string.h>
int main()
       char a[2000];
       int line_number[20];
       int i=0, j=0, r=1, k=0;
       gets(a);
       for(k=0;k<20;k++)
```

```
{
                        line_number[k]=r;
                        r++;
        printf("line_number%d: ",line_number[j]);
        while(a[i]!='\setminus 0')
                printf("%c",a[i]);
                if(i%76==0 && i!=0)
                                printf("\n");
                                printf("line_number%d: ",line_number[j+1]);
               į++;
C:₩WINDOWS₩system32₩cmd.exe
27.
#include <stdio.h>
#include <string.h>
int main()
       char a[2000] = {'\setminus 0'};
       int line_number[20],line_count[20];
       int i=0,j=0,r=1,k=0;
       int num1,num2;
       int x,y;
```

```
gets(a);
        printf("Enter n");
       scanf("%d",&num1);
        printf("Enter m");
        scanf("%d",&num2);
       for(k=0;k<20;k++)
                        line_number[k]=r;
        printf("line_number%d: ",line_number[j]);
        while(a[i]!='\0')
                printf("%c",a[i]);
                if(i%76==0 && i!=0)
                                 printf("\n");
                                 printf("line_number%d: ",line_number[j+1]);
                į++;
       x=(num1)*76-76;
       y=(num2)*76*2-76*num2;
       printf("\n");
       a[strlen(a)]='\setminus 0';
       for(i=x;i<y-1;i++)</pre>
                printf("%c",a[i]);
로 선택 C:₩WINDOWS₩system32₩cmd.exe
```

printf("Enter a story ");

```
28.
```

```
#include <stdio.h>
int main()
{
         char main[200],pattern[20],replace[20],new_text[200];
         int i=0,j,k,x=0,q=0,n=0;
         int flag=0;
         printf("Enter the main text : ");
         gets(main);
         printf("Enter the pattern to be replaced : ");
         gets(pattern);
         while(main[i]!='\0')
                            j=0,k=i;
                   while(main[k]==pattern[j]&&pattern[j]!='\0')
                            j++;
                            k++;
                   if(pattern[j]=='\setminus 0')
                            q=k;
                            flag=1;
                   new_text[x]=main[q];
                   χ++;
                   į++;
                   q++;
                   new_text[x]='\setminus 0';
                   if(flag==1)
                            printf("A pattern exists in a text\n");
                            puts(new_text);
                   else
                            printf("A pattern does not exists in a text");
}
```

```
C:₩WINDOWS₩system32₩cmd.exe
Enter the main text : supermario
Enter the pattern to be replaced : uper
A pattern exists in a text
smario
계속하려면 아무 키나 누르십시오 . . .
29.
#include <stdio.h>
#include <string.h>
int main()
       char stud[4][10]={"amy","billy","cox"};
       char new_stud[4][10];
       char a[10];
       int i,j=0,k;
       char temp[10];
       printf("Enter the new student's name : ");
       gets(a);
       strcpy(stud[3],a);
       for(i=0;i<4;i++)
                      for(j=0;j<3-i;j++)
                             if(strcmp(stud[j],stud[j+1])>0)
                                            strcpy(temp,stud[j]);
                                            strcpy(stud[j],stud[j+1]);
                                            strcpy(stud[j+1],temp);
       for(i=0;i<4;i++)
                      puts(stud[i]);
```

}

# C:₩WINDOWS₩system32₩cmd.exe

```
Enter the new student's name : mario
amy
billy
cox
mario
계속하려면 아무 키나 누르십시오 . .
30.
#include <stdio.h>
#include <string.h>
int main()
       char stud[3][10]={"amy","billy","cox"};
       char new_stud[3][10]=\{'\setminus 0'\};
       char name[10];
       char(*p)[10];
       int i=0,j=0,k=0;
       p=stud;
       printf("Enter the name you want to erase\n");
        gets(name);
       for(i=0;i<3;i++)</pre>
               {
                        if(strcmp(name,p[i])!=0)
                                        strcpy(new_stud[j],p[i]);
                                        j++;
                                }
                }
                for(i=0;i<3;i++)
                        printf("%s\n",new_stud[i]);
       }
```

# ou 선택 C:₩WINDOWS₩system32₩cmd.exe

Enter the name you want to erase amy

The rest of students names are billy The rest of students names are cox 계속하려면 아무 키나 누르십시오 . . .

#### Multiple-choice Questions

- 1. (b)
- 2. (c)
- 3. (a)
- 4. (c)
- 5. (d)
- 6. (a)
- 7. (c)
- 8. (b)
- 9. (b)
- 10. (b)

### True or False

- 1. F
- 2. F
- 3. T
- 4. T
- 5. T
- 6. T
- 7. T
- 8. T
- 9. F
- 10. F
- 11. T
- 12. F
- 13. F
- 14. T
- 15. F

#### Fill in the blanks

- 1. null-terminated character arrays
- 2. '\0'

- 3. 5
- 4. 0(zero)
- 5. successive
- 6. 99
- 7. scanf
- 8. 65-90
- 9. converting a character into upper
- 10. s1 will come after s2
- 11. strrev
- 12. GOOD MOR
- 13. 15
- 14. Pattern matching
- 15. str1>str2
- 16. strlen()
- 17. puts()