



```
*****  
* convolve.c  
***** /
```

```
/* Standard includes */  
#include <assert.h>  
#include <math.h>  
#include <stdio.h> /* malloc(), realloc() */
```

```
/* Our includes */  
#include "base.h"  
#include "error.h"  
#include "convolve.h"  
#include "klt_util.h" /* printing */
```

```
#define MAX_KERNEL_WIDTH 71
```

```
typedef struct {  
    int width;  
    float data[MAX_KERNEL_WIDTH];  
} ConvolutionKernel;
```

```
/* Kernels */
```

Fundamentals of Programming

Lecture 6

Decision making

تصمیم گیری decision making



K. N. Toosi
University of Technology

```
#include <stdio.h>
```

prog11.c

```
int main() {
```

```
    int a,b;
```

```
    scanf("%d %d", &a, &b);
```

```
    if (a > b) {
```

```
        printf("a is bigger than b\n");
```

```
    }
```

```
    return 0;
```

```
}
```

تصمیم گیری decision making



K. N. Toosi
University of Technology

```
#include <stdio.h>
```

prog11.c

```
int main() {
```

```
    int a,b;
```

```
    scanf("%d %d", &a, &b);
```

```
    if (a > b) {
```

```
        printf("a is bigger than b\n");
```

```
    }
```

```
    return 0;
```

```
}
```

تصمیم گیری decision making



K. N. Toosi
University of Technology

```
#include <stdio.h>
```

prog11.c

```
int main() {
```

```
    int a,b;
```

```
    scanf("%d %d", &a, &b);
```

```
    if (a > b) {
```

```
        printf("a is bigger than b\n");
```

```
    }
```

```
    return 0;
```

```
}
```

```
CS@kntu:lecture5$ gcc prog11.c && ./a.out
```

```
12
```

```
10
```

```
a is bigger than b
```

```
CS@kntu:lecture5$
```

```
CS@kntu:lecture5$ gcc prog11.c && ./a.out
```

```
12
```

```
14
```

```
CS@kntu:lecture5$ gcc prog11.c && ./a.out
```

```
12
```

```
12
```

```
CS@kntu:lecture5$
```

تصمیم گیری decision making



K. N. Toosi
University of Technology

```
#include <stdio.h>
```

prog12.c

```
int main() {  
    int a,b;  
  
    scanf("%d %d", &a, &b);  
  
    if (a > b) {  
        printf("a is bigger than b\n");  
    }  
    else {  
        printf("a is not bigger than b\n");  
    }  
  
    return 0;  
}
```

تصمیم گیری decision making



K. N. Toosi
University of Technology

```
#include <stdio.h>
```

prog12.c

```
int main() {
```

```
    int a,b;
```

```
    scanf("%d %d", &a, &b);
```

```
    if (a > b) {
```

```
        printf("a is bigger than b\n");
```

```
    }
```

```
    else {
```

```
        printf("a is not bigger than b\n");
```

```
    }
```

```
    return 0;
```

```
}
```

```
CS@kntu:lecture5$ gcc prog12.c && ./a.out
```

```
12
```

```
13
```

```
a is not bigger than b
```

```
CS@kntu:lecture5$ gcc prog12.c && ./a.out
```

```
12
```

```
10
```

```
a is bigger than b
```

```
CS@kntu:lecture5$ gcc prog12.c && ./a.out
```

```
4
```

```
4
```

```
a is not bigger than b
```

تصمیم گیری decision making



K. N. Toosi
University of Technology

prog13.c

```
#include <stdio.h>
int main() {
    int a,b;

    scanf("%d %d", &a, &b);

    if (a > b) {
        printf("a is bigger than b\n");
    }
    else if (a < b) {
        printf("a is smaller than b\n");
    }
    else {
        printf("a equals b\n");
    }

    return 0;
}
```

```
CS@kntu:lecture5$ gcc prog13.c && ./a.out
100
80
a is bigger than b
CS@kntu:lecture5$ gcc prog13.c && ./a.out
100
110
a is smaller than b
CS@kntu:lecture5$ gcc prog13.c && ./a.out
100
100
a equals b
```

مقایسه متغیرها Comparing variables



Operator	Description	Example
==	Checks if the values of two operands are equal or not. If yes, then the condition becomes true.	(A == B) is not true.
!=	Checks if the values of two operands are equal or not. If the values are not equal, then the condition becomes true.	(A != B) is true.
>	Checks if the value of left operand is greater than the value of right operand. If yes, then the condition becomes true.	(A > B) is not true.
<	Checks if the value of left operand is less than the value of right operand. If yes, then the condition becomes true.	(A < B) is true.
>=	Checks if the value of left operand is greater than or equal to the value of right operand. If yes, then the condition becomes true.	(A >= B) is not true.
<=	Checks if the value of left operand is less than or equal to the value of right operand. If yes, then the condition becomes true.	(A <= B) is true.

Practice



K. N. Toosi
University of Technology

برنامه ای بنویسید که دو عدد را بگیرد و بیشینه آن دو را چاپ کند.

Write a C program reading two integers and printing their maximum.

Practice: maximum



K. N. Toosi
University of Technology

prog14.c

```
#include <stdio.h>

int main() {
    int a,b;
    scanf("%d %d", &a, &b);

    if (a > b) {
        printf("%d\n",a);
    }
    else {
        printf("%d\n",b);
    }

    return 0;
}
```

Practice: maximum



K. N. Toosi
University of Technology

```
#include <stdio.h>

int main() {
    int a,b;
    scanf("%d %d", &a, &b);

    if (a > b) {
        printf("%d\n",a);
    }
    else {
        printf("%d\n",b);
    }

    return 0;
}
```

prog14.c

```
CS@kntu:lecture5$ gcc prog14.c && ./a.out
7
8
8
CS@kntu:lecture5$ gcc prog14.c && ./a.out
7
6
7
CS@kntu:lecture5$ gcc prog14.c && ./a.out
7
7
7
```

Practice: maximum



prog15.c

```
#include <stdio.h>

int main() {
    int a,b,max;

    scanf("%d %d", &a, &b);

    max = a;
    if (b > a) {
        max = b;
    }

    printf("%d\n",max);
    return 0;
}
```

Practice: absolute value



K. N. Toosi
University of Technology

برنامه ای بنویسید که یک عدد صحیح را بگیرد و قدر مطلق آن را چاپ کند.

Write a C program reading an integers and printing its absolute value.

Practice: absolute value



```
#include <stdio.h>
int main() {
    int a;

    scanf("%d", &a);

    if (a > 0) {
        printf("%d\n", a);
    }
    else {
        printf("%d\n", -a);
    }

    return 0;
}
```

Practice: absolute value



K. N. Toosi
University of Technology

prog16.c

```
#include <stdio.h>
int main() {
    int a;

    scanf("%d", &a);

    if (a > 0) {
        printf("%d\n", a);
    }
    else {
        printf("%d\n", -a);
    }

    return 0;
}
```

```
CS@kntu:lecture5$ gcc prog16.c && ./a.out
12
12
CS@kntu:lecture5$ gcc prog16.c && ./a.out
-12
12
```

Practice: absolute value



K. N. Toosi
University of Technology

prog17.c

```
#include <stdio.h>
int main() {

    int a;

    scanf("%d", &a);

    if (a < 0) {
        a = -a;
    }

    printf("%d\n", a);

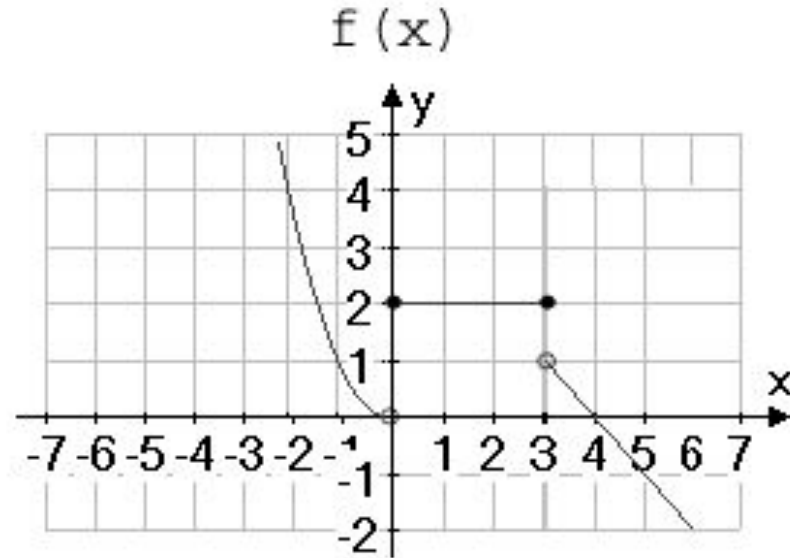
    return 0;
}
```




Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

Write a program that reads x and prints $f(x)$.



http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm



Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm

Write a program that reads x and prints $f(x)$.

```
#include <stdio.h>
int main() {
    int x,y;
    scanf("%d", &x);

    if (x < 0) {
        y = x*x;
    } else {
        if (x <= 3) {
            y = 2;
        }
        else {
            y = 4 - x;
        }
    }

    printf("%d\n",y);
    return 0;
}
```

prog18.c

```
CS@kntu:lecture5$ gcc prog18.c && ./a.out
-2
4
CS@kntu:lecture5$ gcc prog18.c && ./a.out
1
2
CS@kntu:lecture5$ gcc prog18.c && ./a.out
8
-4
```



Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm

Write a program that reads x and prints $f(x)$.

```
#include <stdio.h>
int main() {
    int x,y;
    scanf("%d", &x);

    if (x < 0) {
        y = x*x;
    }
    else if (x <= 3) {
        y = 2;
    }
    else {
        y = 4 - x;
    }

    printf("%d\n",y);
    return 0;
}
```

prog19.c



Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm

Write a program that reads x and prints $f(x)$.

```
#include <stdio.h>
int main() {
    float x,y;
    scanf("%f", &x);
    if (x < 0) {
        y = x*x;
    }
    else if (x <= 3) {
        y = 2;
    }
    else {
        y = 4 - x;
    }

    printf("%f\n",y);
    return 0;
}
```

prog20.c

Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm

Write a program that reads x and prints $f(x)$.

```
#include <stdio.h>
int main() {
    float x,y;
    scanf("%f", &x);
    if (x < 0) {
        y = x*x;
    }
    else if (x <= 3) {
        y = 2;
    }
    else {
        y = 4 - x;
    }

    printf("%f\n",y);
    return 0;
}
```

prog20.c



K. N. Toosi
University of Technology



Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm

Write a program that reads x and prints $f(x)$.

```
#include <stdio.h>
int main() {
    float x,y;
    scanf("%f", &x);
    if (x < 0) {
        y = x*x;
    }
    else if (x <= 3) {
        y = 2;
    }
    else {
        y = 4 - x;
    }

    printf("%f\n",y);
    return 0;
}
```

prog20.c

```
CS@kntu:lecture5$ gcc prog20.c && ./a.out
-1
1.000000
CS@kntu:lecture5$ gcc prog20.c && ./a.out
-1.25
1.562500
CS@kntu:lecture5$ gcc prog20.c && ./a.out
-0.5
0.250000
CS@kntu:lecture5$
```



Practice: piecewise functions

$$f(x) = \begin{cases} x^2, & x < 0 \\ 2, & 0 \leq x \leq 3 \\ 4 - x, & x > 3 \end{cases}$$

http://math2.uncc.edu/~bjwichno/spring2010/math1121/Lecture_Notes/unit_1/Lectures/lec_piecewise_rule.htm

Write a program that reads x and prints $f(x)$.

```
#include <stdio.h>
int main() {
    double x,y;
    scanf("%lf", &x);
    if (x < 0) {
        y = x*x;
    }
    else if (x <= 3) {
        y = 2;
    }
    else {
        y = 4 - x;
    }

    printf("%f\n",y);
    return 0;
}
```

prog20.c