Tutorial 2
Control and Iterations

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Tutorial 1 Exercise 2

Write a program to compute the body mass index (BMI). Input variables are the weight (in kg) and height (in metre). Compute BMI by formula

BMI= weight/(height*height);

Category	BMI
Underweight	<= 18.4
Normal	18.4 ~ 25.0
Overweight	25.0 ~ 30.0
Obese	>= 30.0

Output in which category the user belongs to.

bool data type

```
#include<stdbool.h>
#include <stdio.h>
int main()
{
	bool a;
	int b;
	for(a=0; a<10 ;a++)
	{
		b++;
		printf(“%d %d\n”, a, b);
	}
}
```

bool data type

```
#include<stdbool.h>
#include <stdio.h>
int main()
{
        bool a;
        int b;                                  b = 0;
        for(a=0; a<10 ;a++)          <-------- infinite loop
        {
                b++;
                printf("%d %d\n", a, b);
        }
}
```

Exercise 1:

Assume *i*=5, *j*=7, *k*=4 and *m*=-2.
What does each of the following print?

a) printf(“%d”, i==5);
b) printf(“%d”, j!=3);
c) printf(“%d”, i>=5 && j<4);
d) printf(“%d”, !m && k>m);
e) printf(“%d”, !k || m);
f) printf(“%d”, k-m<j || 5-j>=k);
g) printf(“%d”, j+m<=i && !0);
h) printf(“%d”, !(j-m));
i) printf(“%d”, !(k>m));
j) printf(“%d”, !(j>k));

Control

if
else
else if
switch

```
int a, b;

…

if(a!=b)
{
    if(a>b)
        printf(“a>b\n”);
    else if(a=0)
        printf(“a=0\n”);

}
else if(a==0)
    printf(“a=b=0\n”);
else
    printf(“a=%d\n”,a);
```

Exercise 2

```
#include <stdio.h>

int main()
{
    int a = 10;
    if(!a)
        printf("True\n");
    else
        printf("False\n");

    while(a)
    {
        printf(“%d\n”, a);
        a--;
    }
}
```

goto

Allows you to ‘jump’ to somewhere in a program

```
xx:
…

if(a>b)
    goto xx;
```

Iteration

while
do while
for

```
int i=0;
while(i<10)
    printf("%d", i);

do
{
    i++;
    …
} while(i<10)

for(i=0; i<10; i++)
{
    …
}
```

Break and continue

```
while(true)
{
   if (someone_has_won() || someone_wants_to_quit() == TRUE)
   {break;}
   take_turn(player1);
   take_turn(player2);
}
```

```
for (player = 1; player<100; player++)
 {
       if (player > total_number_of_players)
       {break;}
       if (is_bankrupt(player))
       {continue;}
       take_turn(player);
 }
```

Frequent mistakes

Three elements in an iteration:

Initial value

Exit condition

Increment

```
for(i=0; i<10; i++)
{
     printf(“%d\n”,i);
}
do
{
    printf(“%d\n”,i);
    i++;
} while(i<10)
```

Frequent mistakes

Infinite loop: exit condition will never be met

No loop:

```
i = 0;
do
{
    printf(“%d\n”,i);
} while(i<10)

for(i=0; i>10; i++)
{
    printf(“%d\n”,i);
    …
}
```

4.8 What does the following program do?

```
1  #include <stdio.h>
2  int main(void)
3  {
4     int x, i, j;
5     // prompt user for input
6     printf("%s", "Enter an integer in the range 1-20:");
7     scanf("%d", &x); // read values for x
8     for (i = 1; i <= x; i++) { // count from 1 to x
9        for (j = 1; j <= x; j++) { // count from 1 to x
10          if (j==i)
11             printf("%c", '@'); // output @
12          else
13             printf("  ");
14       } // end inner for
15       printf("\n");
16    } // end outer for
17 } // end of main
```

Exercise 4

- Design a program to create a menu like this: