Programming Fundamentals

(H.W.P)

Book: (How to Program C)

Chapter #3 (Exercise)

→ Only While Loop Questions

(3.9) @

Error: Missing right curly brace '}' after the statement "++c;"

Correction: Add right curly brace '}' after the statement "++c;"

(3.10)

Error: The value of z which is 100 is not changing because decreament statement is missing. It cause the infinite loop.

Correction: Add decreament statement before the right curly brace "z--;", so that value of z eventually become zero.

(3.5)

```
#include <stdio.h>
int main() {
    int x, sum;
    x = 1;
    sum = 0;
    while (x < 11) {
        sum += x;
        x++;
    }
    printf("The sum is : %d\n", sum);
    return 0;
}
```

(3.8)

```
#include <stdio.h>
int main() {
    int x, y, i, power;
    i = 1;
    power = 1;
    scanf("%d%d", &x, &y);
    while (i <= y) {
        power *= x;
        i++;
    }
    printf("%d\n", power);
    return 0;
}
```

3.11

(b) Error :- we don't initialize the variable "total", as a result a value of 'x' add to the garbage value of 'total'.

Correction :- We need to initialize the variable "total = 0;"

(c)

Error :- Because C is a case-sensitive language, so C compiler does not understand the meaning of "While" so it gives an error "undefined".

Correction :- The true of way of writing keyword is "while" all characters of while loop must be in lowercase.

(d)

Error :- Its a logical error, an infinite loop is runing when we execute the program because of while loop condition, because condition given in the while loop is always true.

Correction: We need to false the condition of while loop, so that a finite loop will be run.

3.13

1
4
9
16
25
36
49
64
81
100
385

3.25

```
#include<stdio.h>
int main() {
    int N = 1;
while (N <= 10) {
printf("%d\t %d\t %d\t %d\n", N,
      N * 10, N * 100, N * 1000);
   N++;
}
return 0;
}
```

3.26

```
#include<stdio.h>
int main() {
  int A = 3;
  printf("A\tA+2\tA+4\tA+6\n");
  while (A <=15) {
    Printf("%d\t%d\t%d\t%d\n", A, A+2,
           A+4, A+6);
    A = A + 3;
  }
  return 0;
}
```

3.29 Output

```
****
+++++++++
****
+ + +++++++
****
+ + + + + + + + +
****
+ + + + + + + + +
****
+++ +++++++
```

3.30 Output

```
>>>>>>>>>>>>
<<<<<<<<<<<<<
>>>>>>>>>>>>>
<<<<<<<<<<<<<<
>>>>>>>>>>>>>
<<<<<<<<<<<<<<
>>>>>>>>>>>>>
<<<<<<<<<<<<<<
>>>>>>>>>>>>>
<<<<<<<<<<<<<<
```

3.33

```
#include<stdio.h>
int main() {
  int i = 1, j, counter;
  printf("Enter your value of square
          b/w (1-20) : ");
  scanf("%d", &counter);
if (counter >= 1 && counter <= 20) {
  while (i <= counter) {
      j= 1;
    while (j <= counter) {
      printf("*");
      j++;
    }
```

```
        printf("\n");
        i++;
    }
} else {
    printf("Out of range :: Your
    number is not in the range
    (1-20)!\n");
}
return 0;
}
```

```
#include<stdio.h>
int main() {
    int i=1, j;

while(i <= 8) {
        j = 1;

    while(j <= 8) {

        if(i%2 == 0) {
            printf(" *");
        } else {
            printf("* ");
        }
        j++;
    }
    printf("\n");
    i++;
} return 0;
```

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3.17

```
#include<stdio.h>
void main() {
float miles, gallons, total, counter;
float average, overall_avg;
counter = 0;
Printf("Enter the gallons: ");
  scanf("%f", &gallons);
Printf("Enter driven miles: ");
  scanf("%f", &miles);
while (gallons != -1) {
    average = miles / gallons;
    total = total + average;
    counter ++;
Printf("Your average %f\n", aver
Printf("Enter the gallons: ");
  Scanf("%f", &gallons);
Printf("Enter miles driven: ");
  scanf("%f", &miles);
}
overall_avg = average / counter;
Printf("This is overall_avg =
  %f\n", overall_avg);
  getchar();
}
```

Book: (How to Program C)

CH # 3 (Exercise)

3.1

(a) Algorithm

(b) Program control

(c) Sequence, Repetition and selection

(d) if...else

(e) Compound statement

(f) while

(g) Counter-controlled

(h) Sentinel

3.2

(i) x = x + 1;

(ii) x += 1;

(iii) x++;

(iv) ++x;

3.3

(a) z = x++ + y;

(b) product *= 2;

(c) product = product * 2;

(d) if (count > 10) {
    printf("Count is greater than 10");
}

(e) total = total - --x;

(f) total += x--;

(g) (i) q = q % divisor;

(ii) q %= divisor;

(h) Printf("%.2f", 123.4567);

123.46 is displayed

(i) Printf("%.3f", 3.14159);

3.142 is displayed

3.4

(a) int x, sum;

(b) x = 1;

(c) sum = 0;

(d) sum += x;

(e) printf("The sum is: %d\n", sum);

3.5 (Using 3.4 question)

```
#include<stdio.h>
int main(){
int x=1, sum=0;
while(x<=10){
    sum += x;
    x++;
}
printf("The sum is: %d\n", sum);
  return 0;
}
```

3.6

Product = 25 and x = 6;

3.7

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

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

(c) i = 1;

(d) power = 1;

(e) power *= x;

(f) i++;

(g) while (i <= y)

(h) printf("%d\n", power);

3.8 (Using 3.7 question)

```
#include<stdio.h>
int main(){
  int x, y, i=1, power=1;
```

```
Printf("Enter the number : ");
scanf("%d", &x);

Printf("Enter the power : ");
scanf("%d", &y);

while(i <= y){
    Power *= x;
    i++;
}
Printf("Power is : %d\n", Power);

return 0;
}
```

3.9

(a) Error: The close curly bracket after i++; statement is missing.

(b) Error: Precision used in scanf conversion specifier.

(c) Logical Error: Man is printed every time if condition is true or false.

Because of semicolon after else keyword (else;).

3.10

The value of z never changed in the while loop because we can't use ~~increment~~ decrement (~~increase~~ decrease) the value of z statement. As a result, an infinite loop is created. To prevent this we use decrement statement which is;

```
z--;
```

3.11

(a) Error: Because semicolon after if ends this if statement. Now, given below else keyword where is its if? its if is missing so error occurs (else undefined or unexpected)

(b) Logical Error: Because we don't initialize the variable total so a variable is adding in a garbage value and unwanted result (total) occurs. So, its a logical error. To prevent this we need to initialize the variable total.

(c) Error: C language is a case-sensitive language so it does not know the meaning of While so error occurs (undefined). To prevent this we use while keyword (all characters are in lower-case).

(d) Logical error: An infinite loop occurs because of while condition. Condition false only when y less than 0 to prevent this error.

3.13

1
4
9
16
25
36
49
64
81
100
Total is 385

3.17 (Gas Mileage)

```
#include<stdio.h>

int main() {

float gallon, milles, avg, total, mileage
    total = 0;
float counter = 0;

while printf("Enter gallon (-1 to end): ");
    scanf("%f", &gallon);
printf("Enter miles: ");
    scanf("%f", &miles);
```

```
while (gallon != -1) {
    avg = gallon/miles-miles/gallon;
    Printf("The miles/gallon for this
            tank is %f\n", avg);

    total += avg;
    counter++;

    Printf("Enter gallon (-1 to end): ");
    scanf("%f", &gallon);
    Printf("Enter miles : ");
     scanf("%f", &miles);

}
  overall_avg = total/counter;
  Printf("The overall avg. miles/gallon
          was : %f\n", overall_avg);
    return 0;
}
```

3.18 (Credit Limit Calculator)

```
#include<stdio.h>

int main() {
  int accountNum;
  float accountName, begBalance, totalCharges,
    totalCredits, creditLimit; newBalance;

  while Printf("Enter your Account number: ");
     scanf("%d", &accountNum);

while (accountNum != -1) {

    Printf("Enter beginning balance: ");
    scanf("%f", &begBalance);
    Printf("Enter total charge: ");
    Scanf("%f", &totalCharges);
    printf("Enter total credits: ");
    scanf("%f", &totalCredits);
     Printf("Enter credit limit: ");
      scanf("%f", &creditLimit);

  if newBalance = begBalance + totalCharges
    - totalCredits;

  if (newBalance > creditLimit) {
        printf("Credit Limit exceeded\n");
  } else
      Printf("Credit limit: %f\n",
```

~~credit(quit);~~

```
printf("Account : %d \n", accountNum);
printf("Balance : %f \n", newBalance);

printf("Enter account Number (-1 to end): ");
scanf("%d", &accountNum);
}

return 0;
}
```

Formula

newBalance = begBalance + charges - credits;

Programming Fundamentals

Lecture 16

3.19 (Sales Commission Calculator)

```
#include<stdio.h>
int main() {
    float basicPay = 200, grossSales,
          overallpay, grossPerct;
    ~~while (1)~~
    Printf("Enter sales in dollars
            (-1 to end): ");
    scanf("%f", &grossSales);
    while(grossSales != -1) {
        grossPerct = (9 * grossSales)/100;
        overallpay = basicPay + grossPerct;
        Printf("Salary is: $%f\n",
                overallpay);
        Printf("Enter sales in dollars
                (-1 to end): ");
        scanf("%f", &grossSales);
    }
    return 0;
}
```

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CH # 3: (Exercise)

3.20 (Interest Calculator)

Formula

interest = principal * rate * days/365;

```
#include<stdio.h>

int main() {

    float principal, rate, days, interest;

    printf("Enter loan principal (-1 to end): ");
    scanf("%f", &principal);

    while (principal != -1) {

        printf("Enter interest rate: ");
        scanf("%f", &rate);
        printf("Enter term of the
                loan in days: ");
        scanf("%f", &days);

        interest = principal * rate * days/365;
        printf("The interest charge is $
                %.2f\n", interest);

        printf("Enter loan principal (-1 to
                end): ");
        scanf("%f", &principal);
    }

    return 0;
}
```

3.21 (Salary Calculator)

```
#include<stdio.h>

int main() {

    float totalHours, hourlyRate, Salary;

    printf("Enter working hours
            (-1 to end): ");
    scanf("%f", &totalHours);

    while (totalHours != -1) {
```

```
    printf("Enter hourly rate of
      the worker ($00.00): ");
      scanf("%f", &hourlyRate);
  Salary = totalHours * hourlyRate;
  printf("Salary is $%.2f\n", salary);
  printf("Enter working hours
          (-1 to end): ");
  scanf("%f", &totalHours);
  }

  return 0;
}
```

3.22 (Predecreamenting vs. Postdecreamenting)

```
#include<stdio.h>
int main() {
  int x1 = 4, x2 = 8;
  printf("=> (x1 = 4)\n");
  printf("x1-- : %d\n", x1--);
  printf("x1 : %d\n", x1);
  printf("=> (x2 = 8)\n");
  printf("--x2 : %d\n", --x2);
  printf("x2 : %d\n", x2);
  return 0;
}
```

3.23 (Printing Numbers from a loop)

```
#include<stdio.h>
int main() {
  int i = 1;
  while (i <= 10) {
    printf("%d...", i);
    i++;
  }
  return 0;
}
```

2.24 (Find the largest number)

```
#include<stdio.h>
int main() {
int counter = 1, number, largest = 0;
while (counter <= 10) {
```

```
        printf("Enter number %d : ",
        scanf("%d", &number);
        if ( number > largest) {
            largest = number;
        }
        counter++;
    }
    printf("The largest number is:
            %d\n", largest);
    return 0;
}
```

3.25 (Tabular Output)

(1–10)N N*10 100*N 1000*N

```
#include<stdio.h>
int main() {
    int N=1;
    Printf("N\t10*N\t100*N\t1000*N
while (N <=10) {
    Printf("%d\t %d\t %d\t %d\n",
        N, 10*N, 100*N, 1000*N);
    N++;
}
    return 0;
}
```

3.26 (Tabular Output)

A A+2 A+4 A+6

```
#include<stdio.h>
int main() {
    int A=3;
    Printf("A\t A+2\t A+4\t A+6\n");
    while(A <= 15) {
        Printf("%d\t %d\t %d\t %d\n",
            A, A+2, A+4, A+6);
        A += 3;
    }
    return 0;
}
```

3.27 (Largest Two Numbers)

```
#include<stdio.h>
int main() {
    int i=1, larg1=0, larg2=0, num;
    while (i <= 10) {
        printf("Enter number %d : ", i);
        scanf("%d", &num);
        if (num > larg1) {
            larg2 = larg1;
            larg1 = num;
        } else if (num > larg2) {
            larg2 = num;
        }
        i++;
    }
    printf("1st largest : %d\n2nd largest : %d",
           larg1, larg2);
    return 0;
}
```

3.28 (Validating User Input)

```
#include<stdio.h>
int main() {
    int i=1;
    while (i != -1) {
        printf("Enter number : ");
        scanf("%d", &i);
        if (i == 1) {
            printf("%d is Valid\n", i);
            i = -1;
        } else if (i == 2) {
            printf("%d is Valid\n", i);
            i = -1;
        }
    }
    return 0;
}
```

3.47 (World Population Growth Calculator)

Formula

~~Pop(year) = Popu * (1+growRate)^year~~

$$P(n) = P * (1+r)^n$$

- P → Population
- n → year
- r → growth rate in decimal (first divide by 100)

```
#include<stdio.h>

int main() {

    int currPopulation, estimatedPop;
    float growthRate, annualGrowth = 1;

    printf("Enter current population: ");
    scanf("%f", &growthRate);

    growthRate /= 100;

    int i = 1;

    while (i <= 5) {
```