SOLUTION MIDTERM

Q1. Given   **[3]**

```
int a = 1, b = 4, c = 6, d = 2, x = 2, y = 3, z = 2 ;
```

Stepwise evaluate the following expressions as True or False.

```
a)    (4 + 5 * a >= b – 4) || (c – 8)
```
Answer: True
```
b)    c%x || b == 9/z && (d – 3)
```
Answer: True
```
c)    (b < -2) || (a* 3 >= c) && (b > a)
```
Answer: False

Q2. Write Boolean expressions that represent the given English expressions. Assume

any variables you use have been declared and initialized.   **[2]**

```
a) at least one of x or y is odd
```
Answer: (x%2)||(y%2)

```
b) t is between 2.3 and 3.3
```
Answer: (t>2.3)&&(t<3.3)

Q3. What is wrong with the following code? (Hint: it is a syntax error.)   **[2]**

```
int n;
cin >> n;
if(n > 0) cout << "profit";
else if(n==0)
cout << "break even";
else(n<0)
cout << "negative";
```
Answer: can not specify a condition in last else instead

else
 cout << "negative";

Q4. Write the output for the following   **[2 x 4 = 8]**

   a.

```
int n = 0;
if(!n)
    n = n + 2;
if(n)
    n = -n;
n = n + 2000;
cout<<n;
```

Answer: 1998

b.

```
int n = 1;
while ( n < 11 )
    if(n%3)
        n = n+2;
    else
        n = n+4;
cout<<n;
```

Answer: 13

c.
```
int mark = 85;

if (mark>60)
    cout<<"The grade is D"<<endl;
else if (mark >70)
    cout<<"The grade is C"<<endl;
else if(mark>80)
    cout<<"The grade is B"<<endl;
else if (mark>90)
    cout<<"The grade is A"<<endl;
else
    cout<<"The grade is F"<<endl;
```

Answer: The grade is D

d.
```
int y = 0;
switch (y){
    case 0:  y = y + 11;
    case 1:  y = y / 2;
    case 2:  y = y * 5;
    case 3:  y = y + 1;
    default: y = y%3;
}
cout << y << endl;
```

Answer: 2

Q5. Transform the following into a `for`-statement to perform the same operation.   **[2]**

```
int n;
cout << "Enter n (must be non-negative): ";
cin >> n;

int loop = 0;
while(loop < n) {
    cout << loop*4 << endl;
    loop += 2;
}
```

Answer:
```
for (loop = 0; loop < n; loop+=2)
    cout << loop*4 << endl;
```

Q6. Transform the following into a `do-while`-statement to perform the same operation.   **[2]**

```
int n;
cout << "Enter n (must be non-negative): ";
cin >> n;

int loop = 0;
while(loop < n) {
    cout << loop*4 << endl;
    loop += 2;
}
```
Answer:
```
 int loop = 0;
 if(n>0){
     do{
         cout << loop*4 << endl;
         loop += 2;
     } while(loop < n);
 }
```

Q7. Write the output of the following program. Also, provide values of each variable as it changes.   **[4]**

```
#include <iostream.h>
int main(){
  int sum, j;
  for(int i=1; i<=5; i++)
  {   sum = 0;
```
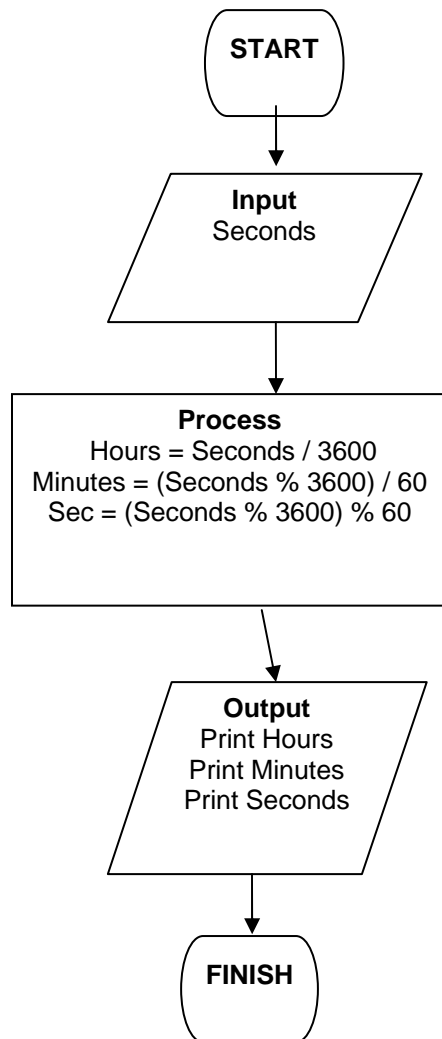
```
        j = 1;
        while (j <=i)
        {     sum = sum + j;
              j++;
        }
        cout << sum << ' ';
    }
  return 0;
  }
```

Answer: 1 3 6 10 15

Q8. Draw a Flow Chart that inputs a number of seconds to calculate the equivalent time in hours, minutes and seconds. For example: 7322 seconds is equivalent to 2 hours 2 minutes 2 seconds. **[3]**

Answer:

```
START
  │
  ▼
┌─────────────────────┐
│       Input         │
│      Seconds        │
└─────────────────────┘
  │
  ▼
┌─────────────────────────────────┐
│            Process              │
│     Hours = Seconds / 3600      │
│  Minutes = (Seconds % 3600) / 60│
│   Sec = (Seconds % 3600) % 60   │
└─────────────────────────────────┘
  │
  ▼
┌─────────────────────┐
│      Output         │
│    Print Hours      │
│    Print Minutes    │
│    Print Seconds    │
└─────────────────────┘
  │
  ▼
FINISH
```

Q9. Faisal just joined a saving plan. It goes like this, on January 1 of every year, he will deposit 10,000 Rs into a saving account. The annual interest rate of the saving account is 5 percent. For example, if he deposits 10,000 Rs on 1/1/2010, then by 31/12/2010, he will have 10500 Rs in the account. On 1/1/2011 he will deposit another 10,000, so he will have 20500 Rs in the account. Then, on 12/31/2011, he will have 21525 Rs in the saving account.

Complete the following program to find out after how many years Faisal will have more than 300,000 Rs in his saving account. **[4]**

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

    double balance =10000;
    int year = 1;

    double interest = 0.05;

//find out how many years does it take for the balance
 //to be more than 300,000
```
Answer:
```
    while(balance < 300000)
    {
       balance *= (1+interest);
       year++;
       balance += 10000;
    }

    cout << year << endl;

    return 0;

}
```