Flowchart examples about repetition

Example 1: Finding the average of 7 marks

```
                    ┌─────────────┐
                   (    Start     )
                    └──────┬──────┘
                           ↓
                    ┌─────────────┐
                    │    i = 1     │
                    └──────┬──────┘
                           ↓
                    ┌─────────────┐
                    │   Sum = 0    │
                    └──────┬──────┘
                           ↓
                    ╱─────────────╲
                   ╱  Input mark x  ╲
                   ╲────────────────╱
                           ↓
                    ┌─────────────┐
                    │ Sum = Sum + x│
                    └──────┬──────┘
                           ↓
            Yes      ╱───────────╲      No    ┌───────────┐
         ┌──────────   i = n?     ──────────→ │ i = i + 1 │
         │          ╲───────────╱             └───────────┘
         ↓
  ┌───────────────┐
  │ Average = Sum / 7 │
  └───────┬───────┘
          ↓
    ╱───────────────╲
   ╱ Output Average   ╲
   ╲──────────────────╱
          ↓
    (     End      )
```
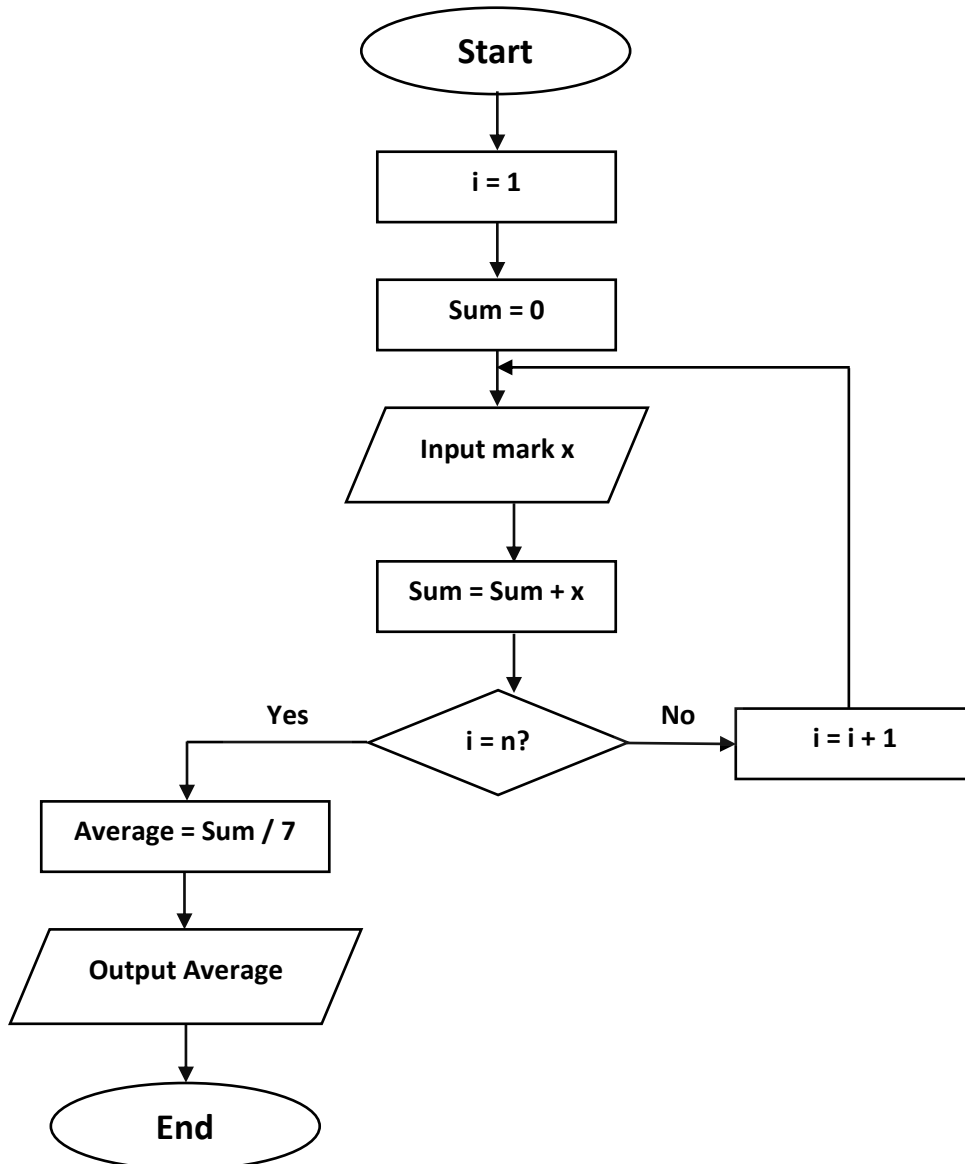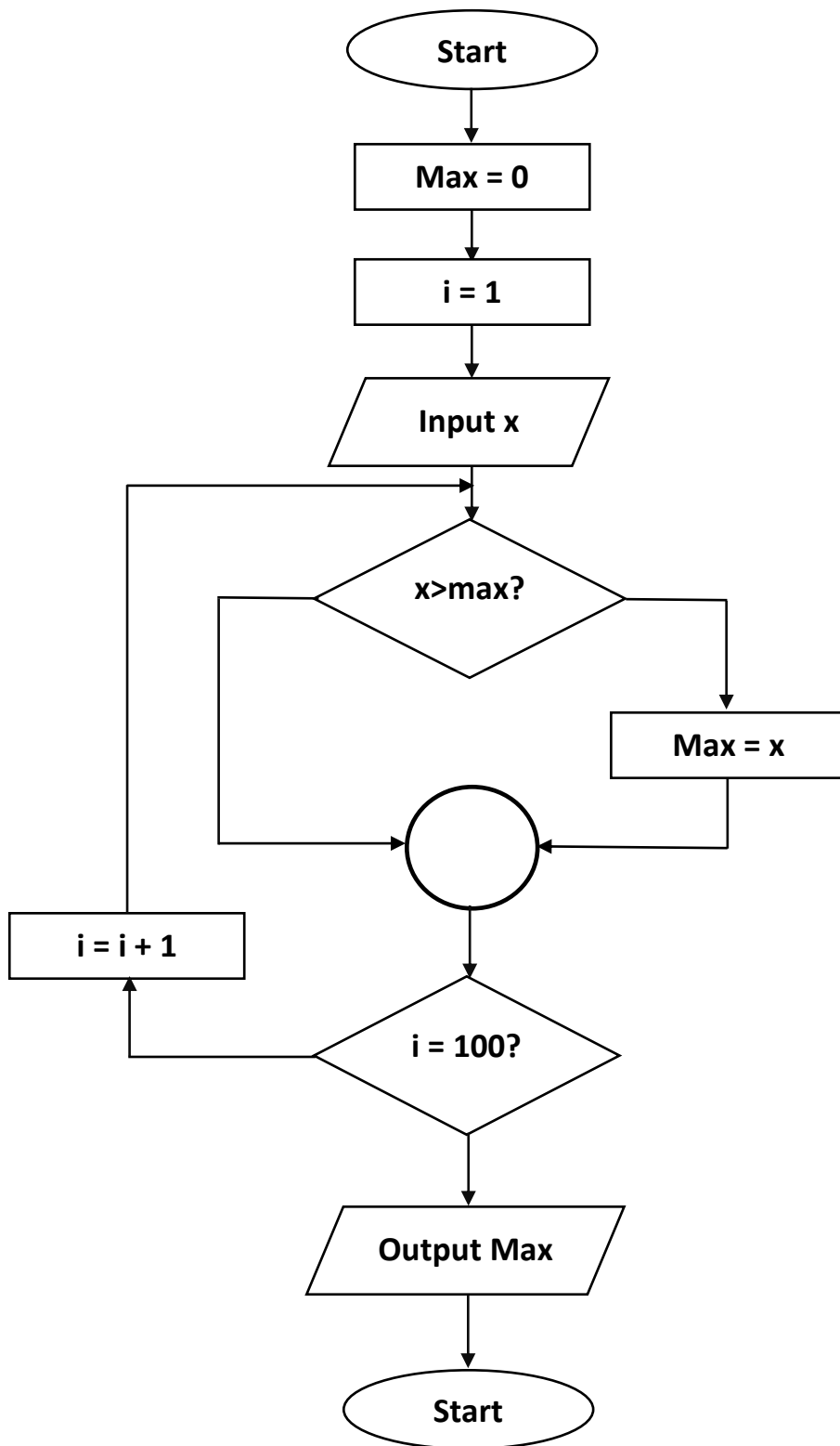
HW: modify the above example to work on n marks instead of 7 (n entered from keyboard).

Example 2: Finding x^y

```
                    ( Start )
                        |
                        v
                  / Input x /
                        |
                        v
                  / Input y /
                        |
                        v
                [ product = 1 ]
                        |
                        v
                  [  i = 1  ]
                        |
                        v
          [ product = product * x ]
                        |
                        v
         No        <  i = y?  >
  [ i = i + 1 ] <---
                        | Yes
                        v
              / Output product /
                        |
                        v
                    ( End )
```
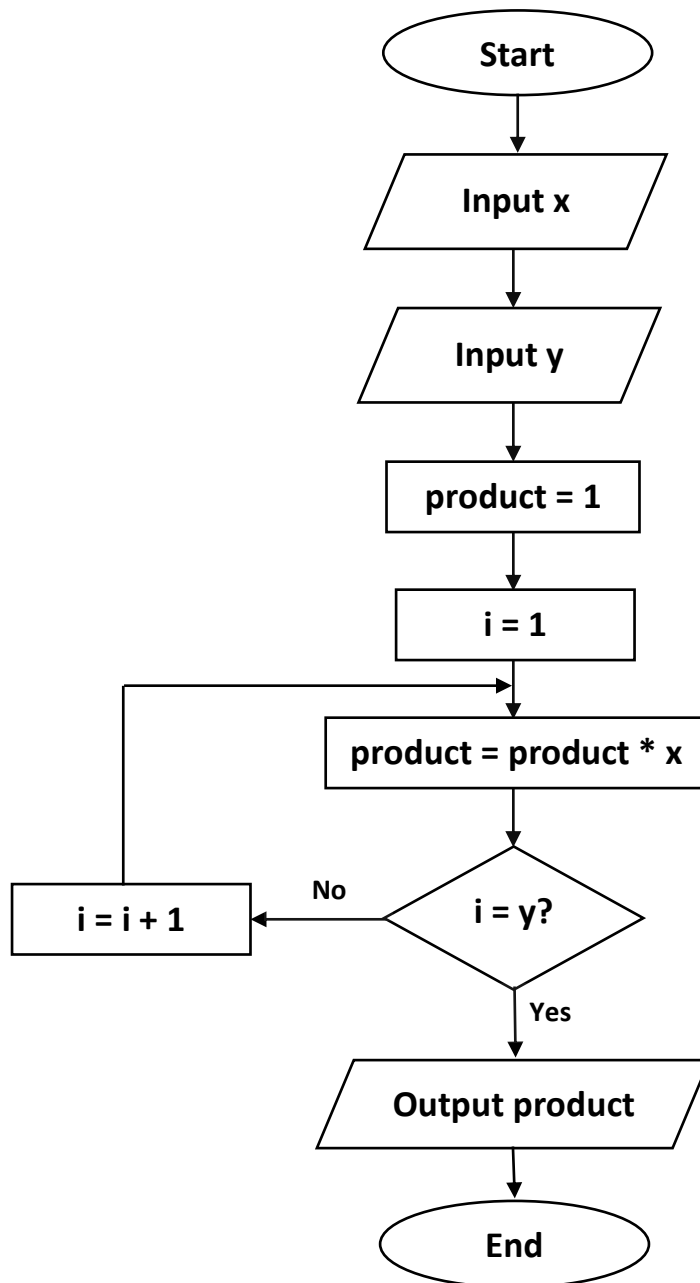
HW: calculate the factorial of an integer number X,

where factorial(x) = 1 * 2 * 3 …. X

Example 3: Finding the maximum value from 100 random values (positive integers) entered from keyboard.

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         ▼
                    ┌─────────┐
                    │ Max = 0 │
                    └────┬────┘
                         ▼
                    ┌─────────┐
                    │  i = 1  │
                    └────┬────┘
                         ▼
                    ╱─────────╲
                    │ Input x │
                    ╲─────────╱
                         ▼
                      ◇ x>max? ◇
                         │
                    No──┘    └──Yes
                              ┌─────────┐
                              │ Max = x │
                              └─────────┘
                           (  ●  )
                              ▼
                         ◇ i = 100? ◇
              ┌─────────┐
              │ i = i+1 │
              └─────────┘
                              ▼
                         ╱───────────╲
                         │ Output Max │
                         ╲───────────╱
                              ▼
                         ┌─────────┐
                         │  Start  │
                         └─────────┘
```

Exercises:

1. Input 100 random numbers and count the odd and even numbers
2. Input 100 random integer numbers (positive and negative) and sum the positive and negative numbers
3. Check if a number is a prime or not
4. Output this series:

   1 2 4 8 16 ….. 1024

5. Output this series:

   2 4 6 8 10 …..100

6. Sum this series:

   3 5 7 ….99

7. Output this series:

   2 3 5 8……144

8. Calculate this series:

   $$Y = \frac{1}{x^2} + \frac{2}{x^3} + \frac{3}{x^4} + \cdots . + \frac{n}{x^{n+1}}$$

9. Calculate this series:

   $$Y = \frac{1}{2!} + \frac{2}{3!} + \frac{4}{5!} + \cdots + \frac{n}{(n+1)!}$$

10. Calculate this series:

   $$Y = \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \cdots + \frac{x^n}{n!}$$