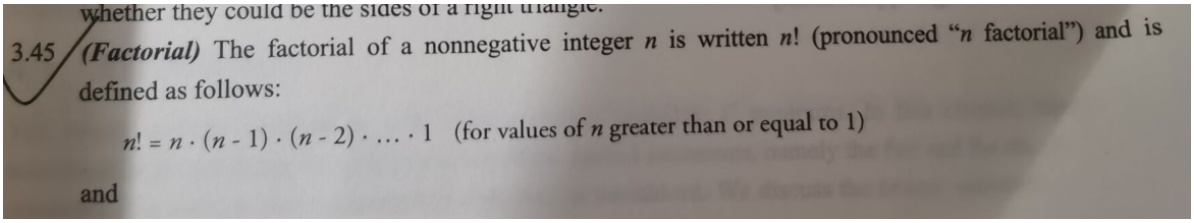
3.45

题目

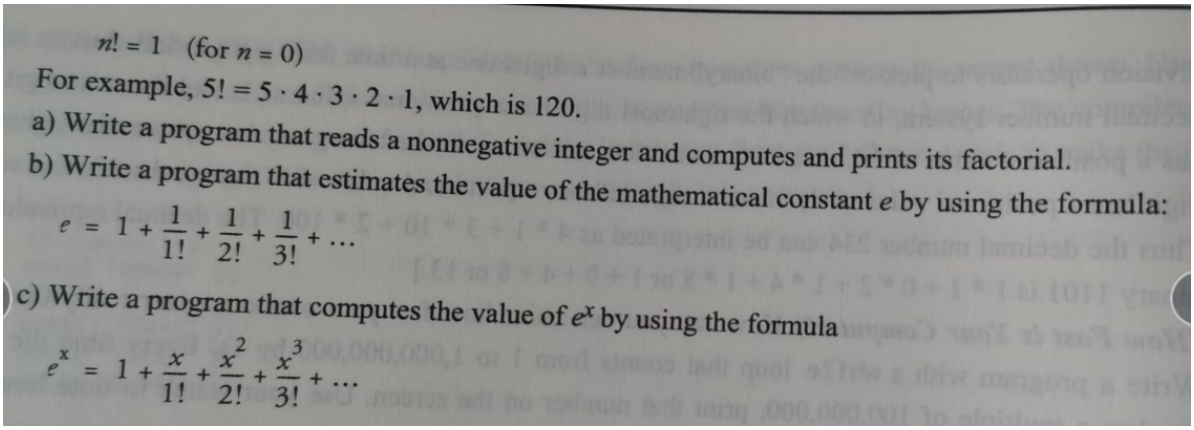


whether they could be the sides of a right triangle.

3.45 *(Factorial)* The factorial of a nonnegative integer n is written $n!$ (pronounced "n factorial") and is defined as follows:

$$n! = n \cdot (n-1) \cdot (n-2) \cdot \ldots \cdot 1 \quad \text{(for values of } n \text{ greater than or equal to 1)}$$

and



$$n! = 1 \quad \text{(for } n = 0\text{)}$$

For example, $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$, which is 120.

a) Write a program that reads a nonnegative integer and computes and prints its factorial.

b) Write a program that estimates the value of the mathematical constant e by using the formula:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots$$

c) Write a program that computes the value of e^x by using the formula

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$$

参考代码：

> 代码不完全按照题目要求。

```c
// by suzhangs
#include <stdio.h>
#include <math.h>  //pow 函数用到。pow用来求次方。

int factorial(n) //定义了函数 factorial 阶乘
{
    int i;
    double sum=1;
    for(i=1;i<=n;i++)
        sum=sum*i;
    return sum;
}

int main()
{

    double e= 1.0;
    int n;
    for (n=1;n<10;n++){
        e = e  + 1.0/factorial(n);
    }
    printf("%d\n",factorial(1));// 演示示例
    printf("%d\n",factorial(2));
    printf("%d\n",factorial(3));
    printf("%d\n",factorial(4));
    printf("..........\n");
    printf("%lf\n",1.0/factorial(4));
```

```
    printf("...........\n");
    printf("%lf\n",e);

    printf("...........\n");
    int x;
    scanf("%d",&x);
    e= 1.0;
    for (n=1;n<x;n++){
        e = e  + pow(x,n)/factorial(n);
    }
    printf("%lf\n",e);
    return 0;
}
```