1. **(10%, Find the smallest n such that )** Use a while loop to find the smallest integer n such that is greater than 12000
2. **(15%, Find the factors of an integer)** Write a program that reads an integer and displays all its smallest factors in increasing order. For example, if the input integer is 120, the output should be as follows: 2, 2, 2, 3, 5
3. **(15%, Display pyramid)** Write a program that prompts the user to enter an integer from 1 to 15 and display a pyramid, as shown in the following run:

Enter the number of lines: 7

7 6 5 4 3 2 1 2 3 4 5 6 7

6 5 4 3 2 1 2 3 4 5 6

5 4 3 2 1 2 3 4 5

4 3 2 1 2 3 4

3 2 1 2 3

2 1 2

1

1. **(10%, Summation)** Write a program to compute the following summation.
2. **(10%, Math: combinations)** Write a program that displays all possible combinations for picking two numbers from integers 1 to 7. Also display the total number of all combinations.
3. 2
4. 3

…

…

The total number of all combinations is 21.

1. **(10%, Occurrence of max numbers)** Write a program that reads integers, finds the largest of them, and counts its occurrences. Assume the input ends with number 0. Suppose you entered 3 5 2 5 5 5 0; the program finds that the largest is 5 and the occurrence count for 5 is 4.

(Hint: Maintain two variables, max and count. max stores the current max number and count stores its occurrences. Initially, assign the first number to max and 1 to count. Compare each subsequent number with max. If the number is greater than max, assign it to max and reset count to 1. If the number is equal to max, increment count by 1.)

Enter numbers: 3 5 2 5 5 5 0

The largest number is 5

The occurrence count of the largest number is 4

1. **(15%, Twin primes)** Twin primes are a pair of prime numbers that differ by 2. For example, 3 and 5 are twin primes, 5 and 7 are twin primes, and 11 and 13 are twin primes. Write a program to find all twin primes less than 1200. Display the output as follows:

(3, 5)

(5, 7)

…

1. **(15%, Palindromic prime)** A palindromic prime is a prime number and also palindromic. For example, 131 is a prime and also a palindromic prime, as are 313 and 757. Write a program that displays the first 120 palindromic prime numbers. Display 10 numbers per line, separated by exactly one space.