Sheet #0

Math background - Due date March 5th ,2022

This sheet just to let you know how importatnt understanding mathematics!!

1. How many binary strings of length **9** are there such that there are three **1's** and **6 0's**.
   (eg. **101010000, 000110100,** …, etc)

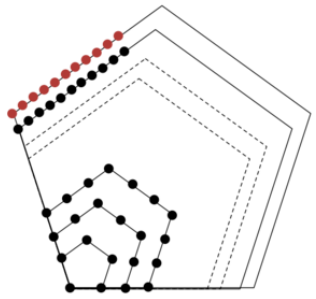
2. How many ways can the integers **1,2,3,4,5,6,7** be arranged such that **2** is adjacent to either **1** or **3**?

3. How many binary strings of length **10** are palindromes?

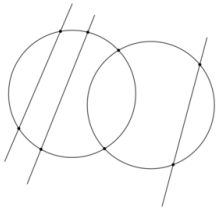
4. At a party, everyone shook hands with everybody else. There were **66** handshakes. How many people were at the party?

5. **20** Stuedends met in the their Algorithm class. Each one shakes hands before and after the class. What is the total number of handshakes?

6. Going from the $\mathbf{n^{th}}$ to the $\mathbf{(n+1)^{th}}$ as shown in figure figure, how many more dots will we add?



7. What is the maximum number of intersection points that can be made with **2** circles and **3** lines?

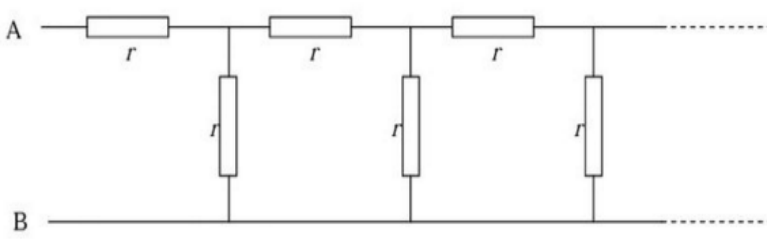


8. What is the maximum number of intersection points that can be made with **10000** circles?

9. How many positive order pairs ntegers solutions for $\mathbf{X + Y <= 20}$

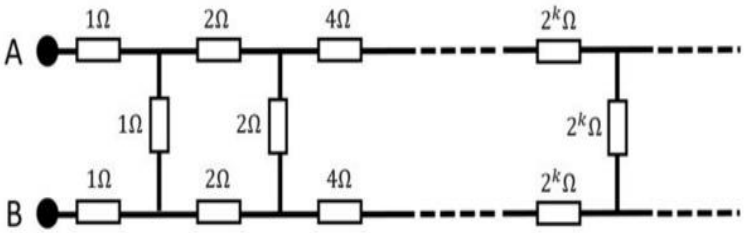
10. How many ordered pairs of integers **(n, m)** satisfy the equation? **n/15 = 12/m**

11. Write a C/C++ code to find the resistance between A and B. Consider an infinite network consisting of resistors (r =1 Ω) as shown in Fig. Find the resultant resistance between points A and B.



(this problem can be solved mathematically in a constant time)

12. Find the resistance between the points **A** and **B** of an infinite circuit shown. The resistance of the resistors in each loop is twice those of the previous loop on its left.

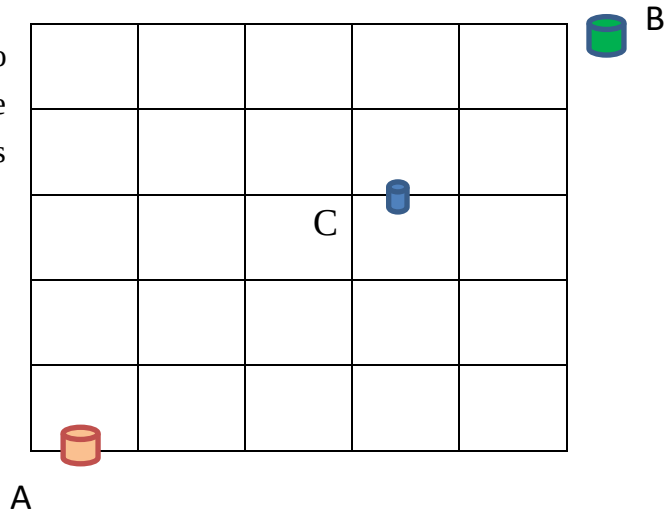


Given that the resistance can be written as: $\mathbf{(a + b^{1/2})/c}$

Find **a,b**, and **c**?

If you couldn't find a,b, and c. Then write a C/C++ program to find the resistance?

13. Ahmed wants to move from point **A** to point **B**. Pathing through point **C**. He can move only up or to the right. How mant different ways are there?



Good Luck!!!