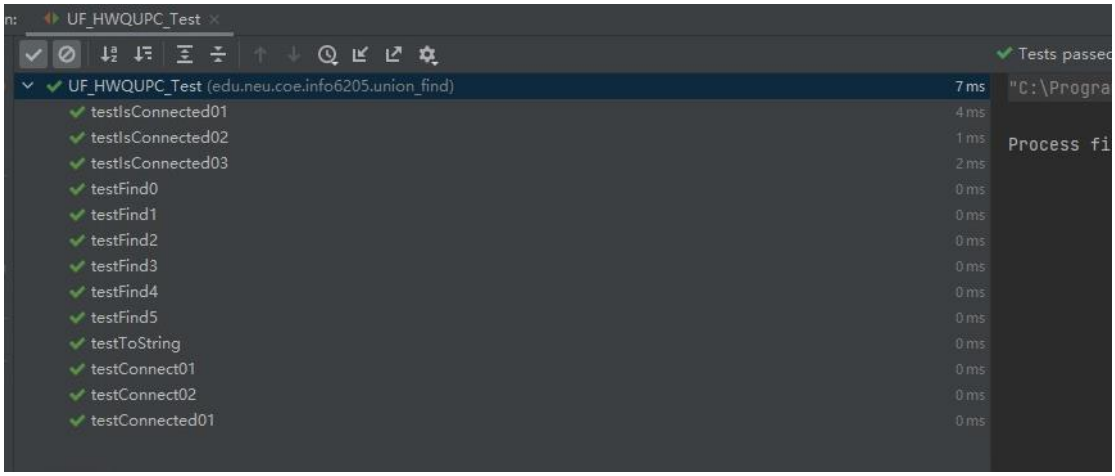
Report 3

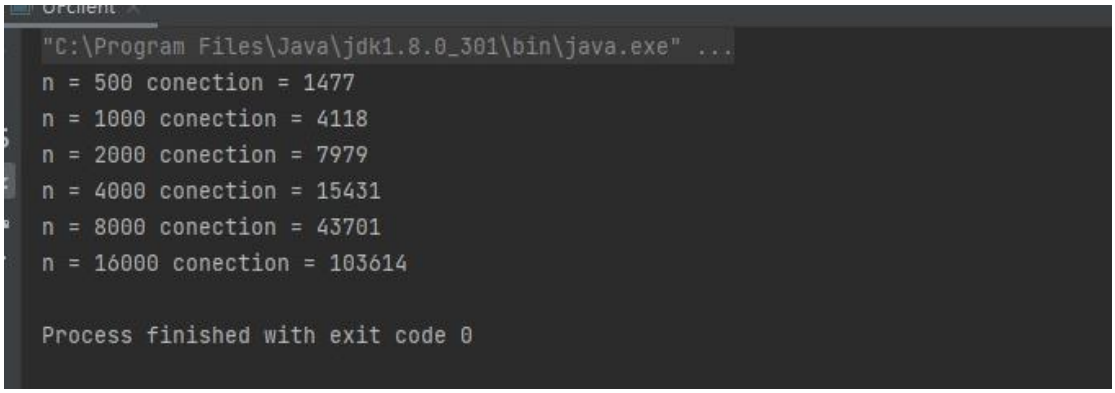
Task:

Determine the relationship between the number of objects (n) and the number of pairs (m) generated to accomplish this.

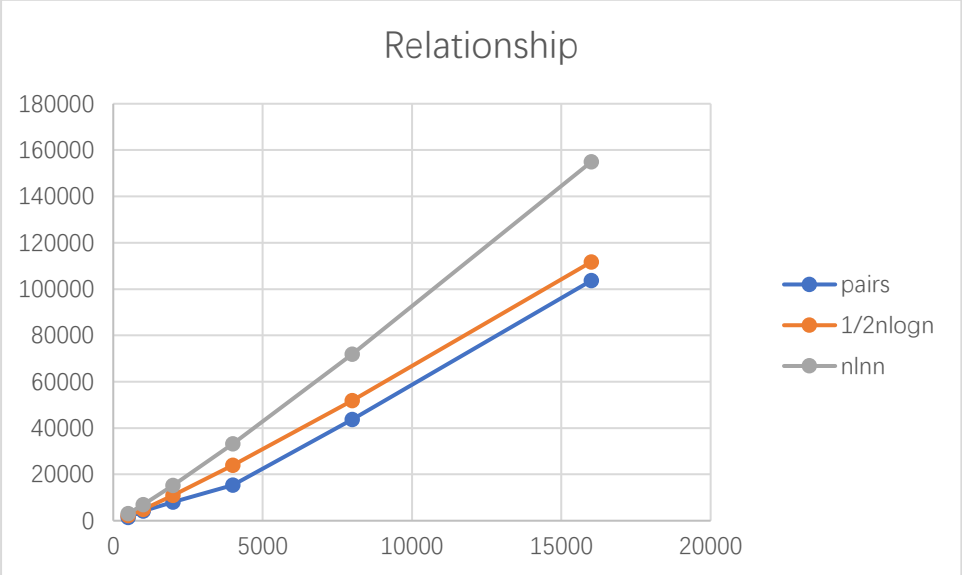
Unit Test:



Relationship:



n	pairs	1/2nlogn	nlnn
500	1477	2240	3105
1000	4118	4930	6900
2000	7979	10910	15200
4000	15431	23920	33160
8000	43701	51840	71840
16000	103614	111680	154880



After observing, I found the relationship is very close to m = n*ln(n) or m = 1/2n*log(n)

What I think might be going on:

There a n objects, to connect all of them, (n-1) of connections are needed. For the first iteration, the possibility of fulfilling a connection is 100% so the pairs that need to generate is 1.

For the second iteration, there are (n-2) remaining connections need to be union, which means the possibility is (n-2)/(n-1), according to geometric distribution, the

attempts(pairs) will be (n-1)/(n-2), thus, to connect all the sites, we need total pairs of:

$$1 + (n-1)/(n-2) + (n-1)/(n-3) + \cdots + (n-1)/1$$

Which is close to $(n-1)*\ln(n-1)$.