# 2022-1 컴퓨팅 사고와 파이썬 프로그래밍 기말고사 Exam2D

# Exam2D. 실수자료형 (float) 리스트에 대한 병합정렬과 퀵정렬 성능 비교 (40점, 시험 시간 45분 (11:15 ~ 12:00))

#### (1) 요구사항

- 난수의 개수 (N)이 주어질 때, -N/200 ~ +(N-1)/200 범위의 중복되지 않는 실수자료형 (float) 난수 리스트를 생성하여 반환하는 함수 genRandFloatList(N)를 사용자 정의 모듈 MyList.py에 구현하라.
- 실수자료형 리스트의 첫 부분과 끝 부분의 리스트 원소를 한 줄 당 per\_line 원소 x sample\_lines 줄 출력하는 함수 printFloatListSample(L, per\_line, sample\_lines)를 MyList.py에 구 현하라. float 자료형인 리스트 원소는 소숫점 이하 2자리 까지 출력할 것.
- 주어진 float 자료형 리스트를 오름차순으로 병합 정렬하는 함수 mergeSort(L)을 사용자 정의 모듈 MySorting.py에 구현하라.
- 주어진 float 자료형 리스트를 오름차순으로 퀵정렬하는 함수 quickSort(L)을 사용자 정의 모듈 MvSorting.py에 구현하라.
- 실수자료형 난수 리스트의 크기 (L\_size)를 입력받고, 중복되지 않는 난수 리스트를 생성한 후, 병합정렬과 퀵정렬을 수행하며, 성능을 비교하는 main() 함수를 작성하라.
- main() 함수에서는 난수 리스트의 크기 (L\_size)를 입력받고, genRandFloatList() 함수를 사용하여 중복되지 않는 난수 리스트를 생성한 후, printFloatListSampe() 함수를 사용하여 출력하며, mergeSort() 함수를 사용하여 정렬한 후, 정렬된 리스트를 출력한다.
- main() 함수에는 정렬된 리스트를 random모듈의 shuffle() 함수를 사용하여 뒤섞은 후, 출력하고, quickSort() 함수를 사용하여 오름차순으로 정렬한 후, 출력한다.
- mergeSort()와 quickSort()를 수행할 때 걸린 경과시간을 측정하여 초 단위로 출력하라.
- 프로그램 출력 첫 부분에 "2022-1 컴사파 Exam2D 학번: 00000000, 성명: 홍길동" 양식으로 본 인 학번과 이름을 출력할 것.

#### (2) main() 함수 예시

```
# Exam2d - Performance Comparisons of Sorting Algorithms (quickSort, mergeSort)
. . . . # 필요한 모듈 import
def main():
....# 2022-1 컴사파 Exam2D 학번: 00000000, 성명: 홍길동 출력
L = [100000, 500000, 1000000, 5000000]
      for L_size in L:
    print("\nGenerating random list of size ({}) ...".format(L_size))
    L = MyList.genRandFloatList(L_size)
            # testing MergeSorting
            print("Before mergeSort of L:")
MyList.printFloatListSample(L, 10, 3)
            t1 = time.time()
            L = MySortings.mergeSort(L)
t2 = time.time()
print("\nAfter mergeSort of L :")
MyList.printFloatListSample(L, 10, 3)
            time_elapsed = t2 - t1
print("Merge sorting of list (size={}) took {} sec".format(L_size, time_elapsed))
            # testing Quick Sorting
            random.shuffle(L)
            print("Before quickSort of L:")
MyList.printFloatListSample(L, 10, 3)
t1 = time.time()
            MySortings.quickSort(L)
            t2 = time.time()
print("After quickSort of L:")
MyList.printFloatListSample(L, 10, 3)
time_elapsed = t2 - t1
print("Quick sorting of list (size={}) took {} sec".format(L_size, time_elapsed))
                          "__main__
if __name__ ==
      main()
```

## (3) shell 입출력 예시

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		of size (10	0000)							Before merg									
Before merge									-440.90	1461.40 1632.93	-1845.23 1301.93	1559.76 997.26	-1462.89 -28.75	-1922.73 293.18	-2061.08 -1077.94	2190.68 1768.14	-485.72 -255.38	-147.18 -2272.32	1239 322
173.74 339.66	-36.61 -78.35	-203.82 42.90	221.48 386.59	86.78 -467.63	-23.76 -413.48	471.33 -343.66	148.47 329.73	330.72 57.05	-440.90 -38.90	-2355.00	1448.34	-47.92	-28.75	-994.67	2012.45	-1926.99	1242.35	1557.95	1594
46.88	170.32	42.90 15.86	426.36	-467.63 378.96	-413.48 320.77	483.73	419.50	307.74	-38.90	-2333.00	1440.34	-47.92	-2194.31	-994.07	2012.45	-1920.99	1242.55	1557.95	1594
40.00	1/0.52	15.00	420.30	3/0.90	320.77	405.75	419.50	307.74	-201.02	-592.49	1263.05	-1863.60	-801.75	-589.64	1816.43	-1025.20	-2058.83	2368.60	1079
275.81	-152.00	381.92	38.38	-391.04	-249.12	-457.98	-284.62	-393.87	-149.85	-618.51	-574.88	441.55	-644.31	-1386.86	68.77	-2337.33	92.27	513.76	1966
-430.15	163.85	-105.61	10.17	-233.17	195.43	-56.40	418.69	388.85	-307.11	659.38	2222.36	-1339.84	-1658.99	-2129.64	1148.52	602.91	-2096.59	-708.36	131
17.33	-91.55	400.41	492.66	301.07	437.89	-496.05	27.72	257.90	305.11										
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-500.00	-499.99	-499.98	-499.97	-499.96	-499.95	-499.94	-499.93	-499.92	-499.91	-2499.90	-2499.89	-2499.88	-2499.87	-2499.86	-2499.85	-2499.84	-2499.83	-2499.82	-249
-499.90	-499.89	-499.88	-499.87	-499.86	-499.85	-499.84	-499.83	-499.82	-499.81	-2499.80	-2499.79	-2499.78	-2499.77	-2499.76	-2499.75	-2499.74	-2499.73	-2499.72	-249
-499.80	-499.79	-499.78	-499.77	-499.76	-499.75	-499.74	-499.73	-499.72	-499.71										
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499.80	499.81	499.82	499.83	499.84	499.85	499.86	499.87	499.88	499.89	2499.90	2499.91	2499.92	2499.93	2499.94	2499.95	2499.96	2499.97	2499.98	249
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		(size=100000	) took 0.23	310969829559	3262 sec					Before quic									
fore quick										1082.91	-1147.62	1614.77	-1452.32	-2017.14	911.76	971.16	508.47	-1232.19	-128
-138.68	-248.41	-30.56	432.42	-69.34	-130.83	188.41	-325.44	34.57	-236.06	-1752.47	-839.60	-1337.66	-859.77	1509.12	-1048.82	617.55	-531.29	-1948.14	-22
45.80	48.63	-160.47	-343.47	-361.35	-314.47	-66.79	-52.58	480.70 41.71	-135.04	-2495.51	-2286.66	1032.27	-1323.58	-1511.80	-446.30	1193.48	983.80	1365.55	-139
316.37	-487.39	230.46	-439.70	-399.85	-63.52	-63.10	-199.91	41.71	423.75	-1476.23	-423.66	-2379.32	-2176.28	-14.60	2014.53	2326.22	708.14	1388.26	-150
-489.99	305.80	-379.48	-245.44	303.34	217.95	7.44	-154.87	-26.96	488.39	-1476.23 -2156.43	-423.66 -612.29	-23/9.32 -1843.09	-2176.28 -1573.03	-14.60 881.48	-894.65	-2441.77	-823.59	-1434.99	-152
87.89	-54.61	-319.85	89.73	-119.22	-311.85	294.32	-447.31	-20.96	-481.14	-899.42	518.70	-2028.78	-1045.80	-38.12	-1924.16	2120.50	-620.95	2332.78	-15
-365.44	177.57	42.99	-225.27	94.29	-456.70	334.78	-91.57	-365.30	-179.90	After quick		2020.70	1045.00	-30.12	1924.10	2120.30	-020.93	2332.70	-15
ter quicks		42155	223127	54125	450170	334170	32.37	303130	275150	-2500.00	-2499.99	-2499.98	-2499.97	-2499.96	-2499.95	-2499.94	-2499.93	-2499.92	-249
-500.00	-499.99	-499.98	-499.97	-499.96	-499.95	-499.94	-499.93	-499.92	-499.91	-2499.90	-2499.89	-2499.88	-2499.87	-2499.86	-2499.85	-2499.84	-2499.83	-2499.82	-249
-499.90	-499.89	-499.88	-499.87	-499.86	-499.85	-499.84	-499.83	-499.82	-499.81	-2499.80	-2499.79	-2499.78	-2499.77	-2499.76	-2499.75	-2499.74	-2499.73	-2499.72	-249
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499.70	499.71	499.72	499.73	499.74	499.75	499.76	499.77	499.78	499.79	2499.80	2499.81	2499.82	2499.83	2499.84	2499.85	2499.86	2499.87	2499.88	249
499.80	499.81	499.82	499.83	499.84	499.85	499.86	499.87	499.88	499.89	2499.90	2499.91	2499.92	2499.93	2499.94	2499.95	2499.96	2499.97	2499.98	249
499.90	499.91	499.92 (size=100000	499.93	499.94	499.95	499.96	499.97	499.98	499.99	Quick sorti	ng of list	size=500000	9) took 1.05	55247545242	3096 sec				
enerating r efore merge		of size (10	00000)							Generating Before merg			000000)						
149.96	-995.22	4030.43	59.90	2908.36	2307.83	2726.87	-301.17	-4093.81	1607.99	-4473.18	-16561.35	5705.67	9486.40	14103.20	-15110.17	4390.39	-13034.50	-257.10	58
1881.90	4553.06	3267.11	879.30	-4663.93	-3500.58	3290.62	-301.15	1362.07	-4520.56	15343.51	-8108.38	791.13	5883.88	21182.39	11987.61	-13052.74	24622.38	16896.42	209
3594.92	-2304.46	4791.26	3006.04	4171.23	-4071.58	-2620.43	-777.72	-669.34	-2990.44	-13681.95	-13903.19	-17079.95	-9032.97	-8341.01	929.07	10959.97	12240.92	-24277.22	158
1,522,525	11.00																		
4477.35	1154.37	3034.99	-2175.56	4691.34	-4357.66	-3105.65	-1316.14	-3002.88	1209.61	-6470.71	366.24	20824.88	-21369.90	-24279.43	12985.53	20848.11	-5101.17	22450.14	50
1385.92	-2121.61	2291.60	2949.63	-3630.15	-2560.20	4693.66	934.59	-3751.31	-4026.02		-13408.07	820.07	6723.95	-16830.26	14737.95	17996.13		-14489.89	177
					4000 04					20299.75							-5047.38		
2365.17	189.53	-1818.04	-4736.69	205.92	4625.04	-2942.40	-645.19	4795.92	-3399.73	-8355.77	22091.48	6231.78	-10889.19	8168.06	21735.15	1150.87	16598.05	15278.83	
ter mergeS	189.53 Sort of L :					-2942.40				-8355.77 After merge	Sort of L :					1150.87	16598.05	15278.83	163
ter merges -5000.00	189.53 Sort of L : -4999.99	-4999.98	-4999.97	-4999.96	-4999.95	-2942.40 -4999.94	-4999.93	-4999.92	-4999.91	-8355.77 After merge -25000.00	Sort of L : -24999.99	-24999.98	-24999.97	-24999.96	-24999.95	1150.87	16598.05 -24999.93	15278.83	163 -249
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ter merges -5000.00 -4999.90 -4999.80  4999.70 4999.90 rge sortir fore quick	189.53 5ort of L: -4999.99 -4999.89 -4999.79  4999.71 4999.81 1999.91 19 of list	-4999.88 -4999.78 4999.72 4999.82 4999.92 (size=100000	-4999.97 -4999.87 -4999.77 4999.73 4999.83 4999.93 0) took 2.5	-4999.96 -4999.76 -4999.74 4999.84 4999.94 969179630279	-4999.95 -4999.85 -4999.75 4999.85 4999.85 4999.95	-4999.94 -4999.84 -4999.74 4999.76 4999.86 4999.96	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.98	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99	-8355.77  After merge -25000.00 -24999.90 -24999.80 24999.70 24999.80 24999.90 Merge sorti Before quic	Sort of L: -24999.99 -24999.79 .: 24999.71 24999.81 24999.81 14999.91	-24999.98 -24999.88 -24999.78 24999.72 24999.82 24999.92 (size=50000	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 80) took 17	-24999.96 -24999.76 -24999.74 24999.84 24999.94 .9327507019	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.95 84297 sec	-24999.94 -24999.84 -24999.74 24999.76 24999.86 24999.96	16598.05 -24999.93 -24999.83 -24999.73 24999.77 24999.87 24999.97	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98	-249 -249 -249 -249 249 249
ter merges -5000.00 -4999.90 -4999.80  4999.70 4999.90 rge sortir fore quick 4513.95	189.53 Sort of L: -4999.99 -4999.89 -4999.79  4999.71 4999.91 189 of list Sort of L 3606.25	-4999.98 -4999.88 -4999.78 4999.72 4999.82 4999.92 (size=100000 :	-4999.97 -4999.87 -4999.77 4999.73 4999.83 4999.93 0) took 2.1	-4999.96 -4999.86 -4999.76 4999.74 4999.84 4999.94 969179630279 -1168.06	-4999.95 -4999.85 -4999.75 4999.75 4999.85 4999.95 9541 sec 225.23	-2942.40 -4999.94 -4999.84 -4999.74 4999.86 4999.96	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.98	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99	-8355.77  After merge -25000.00 -24999.90 -24999.80 24999.70 24999.80 24999.90 Merge sorti Before quic -19387.94	Sort of L: -24999.99 -24999.89 -24999.79 24999.71 24999.81 24999.91 ng of list kSort of L -14927.20	-24999.88 -24999.78 -24999.72 -24999.82 -24999.92 (size=50000 : -9801.65	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 80) took 17 -14079.28	-24999.96 -24999.86 -24999.76 24999.74 24999.84 24999.94 .9327507019	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.95 04297 sec 10122.67	-24999.94 -24999.84 -24999.74 24999.76 24999.86 24999.96	16598.05 -24999.93 -24999.83 -24999.77 24999.77 24999.97 20948.48	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98	-249 -249 -249 -249 249 249
ter merges -5000.00 -4999.90 -4999.80  4999.70 4999.80 4999.90 rge sortir fore quick 4513.95 -1290.23	189.53 Sort of L: -4999.99 -4999.89 -4999.79  4999.71 4999.81 4999.91 ng of list CSort of L 3606.55 -396.63	-4999.98 -4999.88 -4999.78 4999.72 4999.82 4999.92 (size=100000 : : 3833.44 -205.04	-4999.97 -4999.87 -4999.77 4999.73 4999.83 4999.93 0) took 2.9	-4999.96 -4999.86 -4999.76 -4999.74 -4999.84 -4999.94 969179630279 -1168.06 -2247.62	-4999.95 -4999.85 -4999.75 4999.75 4999.85 4999.95 9541 sec 225.23 3816.59	-4999.94 -4999.84 -4999.74 4999.76 4999.86 4999.96	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.98	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99	-8355.77  After merge -25000.00 -24999.90 -24999.80 -24999.80 24999.90 Merge sorti Before quic -19387.94 -21649.35	Sort of L: -24999.99 -24999.89 -24999.79 . 24999.71 24999.81 24999.91 ng of list kSort of L -14927.20 -17359.89	-24999.98 -24999.88 -24999.78 24999.72 24999.82 24999.92 (size=50000 : -9801.65 -15114.39	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 800) took 17 -14079.28 18854.64	-24999.96 -24999.86 -24999.76 24999.74 24999.84 24999.94 .9327507019 11427.80 -4952.62	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.95 04297 sec 10122.67 3198.08	-24999.94 -24999.84 -24999.74 24999.76 24999.86 24999.96	16598.05 -24999.93 -24999.83 -24999.73 24999.77 24999.87 24999.97	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98 19547.51 -8479.07	-249 -249 -249 249 249 -175 -201
ter merges -5000.00 -4999.90 -4999.80 	189.53 Sort of L: -4999.99 -4999.89 -4999.79  4999.71 4999.91 189 of list Sort of L 3606.25	-4999.98 -4999.88 -4999.78 4999.72 4999.82 4999.92 (size=100000 :	-4999.97 -4999.87 -4999.77 4999.73 4999.83 4999.93 0) took 2.1	-4999.96 -4999.86 -4999.76 4999.74 4999.84 4999.94 969179630279 -1168.06	-4999.95 -4999.85 -4999.75 4999.75 4999.85 4999.95 9541 sec 225.23	-2942.40 -4999.94 -4999.84 -4999.74 4999.86 4999.96	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.98	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99	-8355.77  After merge -25000.00 -24999.90 -24999.80 24999.70 24999.80 24999.90 Merge sorti Before quic -19387.94	Sort of L: -24999.99 -24999.89 -24999.79 24999.71 24999.81 24999.91 ng of list kSort of L -14927.20	-24999.88 -24999.78 -24999.72 -24999.82 -24999.92 (size=50000 : -9801.65	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 80) took 17 -14079.28	-24999.96 -24999.86 -24999.76 24999.74 24999.84 24999.94 .9327507019	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.95 04297 sec 10122.67	-24999.94 -24999.84 -24999.74 24999.76 24999.86 24999.96	16598.05 -24999.93 -24999.83 -24999.77 24999.77 24999.97 20948.48	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98	-249 -249 -249 -249 249 249
ter merges -5000.00 -4999.90 -4999.80  4999.70 4999.90 rge sortir fore quick 4513.95 -1290.23 -4091.74	189.53 Sort of L: -4999.99 -4999.89 -4999.71 -4999.71 4999.91 ag of list (Sort of L 3606.25 -396.63 -2027.52	-4999.98 -4999.88 -4999.78 4999.72 4999.82 4999.92 (size=100000 : : 3833.44 -205.84 -865.23	-4999.97 -4999.87 -4999.77 4999.73 4999.83 4999.93 (0) took 2.1 4189.26 787.42 1727.82	-4999.96 -4999.86 -4999.76 4999.74 4999.84 4999.94 969179630279 -1168.06 -2247.62 -1526.31	-4999.95 -4999.85 -4999.75 4999.75 4999.85 4999.95 9541 sec 225.23 3816.59 4212.81	-4999.94 -4999.84 -4999.74 4999.76 4999.86 4999.96 -2676.79 -4342.20 3426.49	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97 2733.16 2603.55 3760.72	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.88 4999.98	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99	-8355.77  After merge -25000.00 -24999.80 -24999.80 -24999.80 -24999.90 Merge sorti Before quici -19387.94 -21649.35	Sort of L: -24999.99 -24999.89 -24999.79 24999.71 24999.81 24999.91 ing of list kSort of L: -14927.20 -17359.89 -9309.28	-24999.98 -24999.88 -24999.78 24999.72 24999.82 24999.92 (size=50000 : -9801.65 -15114.39 13353.40	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 80) took 17 -14079.28 18854.64 -15844.51	-24999.96 -24999.86 -24999.76 24999.74 24999.84 24999.94 .9327507019 11427.80 -4952.62 18614.71	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.95 04297 sec 10122.67 3198.08 16229.87	-24999.94 -24999.84 -24999.74 24999.76 24999.86 24999.96	16598.05 -24999.93 -24999.83 -24999.73 24999.77 24999.87 24999.97 20948.48 1917.16 -24772.94	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98 19547.51 -8479.07 15849.39	-249 -249 -249 249 249 249 -175 -201 -121
ter merges -5000.00 -4999.00 -4999.80  4999.70 4999.80 4999.90 rge sortir fore quick 4513.95 -1290.23 -4991.74 	189.53 Sort of L: -4999.99 -4999.89 -4999.79  4999.71 4999.81 4999.91 ng of list CSort of L 3606.55 -396.63	-4999.98 -4999.88 -4999.78 4999.72 4999.82 4999.92 (size=100000 : 3833.44 -205.04 -865.23	-4999.97 -4999.87 -4999.77 4999.73 4999.83 4999.93 0) took 2.9	-4999.96 -4999.86 -4999.76 -4999.74 -4999.84 -4999.94 969179630279 -1168.06 -2247.62	-4999.95 -4999.85 -4999.75 4999.75 4999.85 4999.95 9541 sec 225.23 3816.59	-2942.40 -4999.94 -4999.84 -4999.74 4999.76 4999.86 4999.96 -2676.79 -4342.20 3426.49 1916.56	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.98	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99 -1560.49 -3840.97 4747.64	-8355.77  After merge -25000.00 -00 -24999.90 -24999.80 -24999.70 -24999.80 -24999.80 -1999.90 Merge sorti Before quic -19387.94 -21649.35 -19427.81 -17771.30	Sort of L: -24999.99 -24999.89 -24999.79 24999.81 24999.81 24999.91 ng of list KSort of L -14927.20 -17359.89 -9309.28 19747.06	-24999.98 -24999.88 -24999.78 24999.72 24999.82 24999.92 (size=50000 : -9801.65 -15114.39	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 80) took 17 -14079.28 18854.64 -15844.51	-24999.96 -24999.86 -24999.76 24999.74 24999.84 24999.94 9327507019 11427.80 -4952.62 18614.71 9535.58	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.95 24999.95 84297 sec 10122.67 3198.08 16229.87	-24999.94 -24999.84 -24999.74 24999.76 24999.76 24999.96 -20129.59 -16145.95 2249.24 -17672.60	16598.05 -24999.93 -24999.83 -24999.73 24999.77 24999.97 20948.48 1917.16 -24772.94 -14210.32	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98 19547.51 -8479.07	-249 -249 -249 249 249 249 -175 -201 -121
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ter merges -5000.00 -4999.00 -4999.80 -4999.80 4999.80 4999.90 rge sortic fore quick 4513.95 -1290.23 -4091.74 2984.12 3518.40 -1838.24	189.53 Sort of L: -4999.99 -4999.89 -4999.71 -4999.81 -4999.91 -5066.25 -396.63 -2027.52 -2266.73 -4884.87	-4999.98 -4999.88 -4999.72 4999.82 4999.92 (size=100000 : : : : : : : : : : : : : : : : :	-4999.97 -4999.87 -4999.77 4999.73 4999.93 0) took 2.1 4189.26 787.42 1727.82	-4999.96 -4999.76 -4999.76 -4999.74 -4999.84 -4999.94 969179630279 -1168.06 -2247.62 -1526.31 -682.42 -303.41	-4999.95 -4999.85 -4999.75 -4999.75 -4999.85 -4999.95 -9541 sec 	-2942.40 -4999.94 -4999.74 -4999.76 -4999.86 -4999.96 -2676.79 -4342.20 3426.49 1916.56 3892.52	-4999.93 -4999.83 -4999.73 4999.77 4999.87 4999.97 2733.16 2603.55 3760.72 -4686.31 -1058.38	-4999.92 -4999.82 -4999.72 4999.78 4999.88 4999.98 3205.27 544.66 3974.53 2824.77 -974.24	-4999.91 -4999.81 -4999.71 4999.79 4999.89 4999.99 -1560.49 -3846.97 4747.64 3384.68 3486.93	-8355.77  After merge -25000.00 -0 -24999.80 -24999.80 -24999.80 -24999.80 -24999.80 -24999.81 -19387.94 -21649.35 -19477.130 -17771.30 -22275.42	Sort of L: -24999.99 -24999.89 -24999.79 . 24999.71 24999.81 24999.81 24999.91 ng of list kSort of L -14927.20 -17359.89 -9309.28 . 19747.06 -19317.21 7212.38	-24999.98 -24999.88 -24999.78 24999.72 24999.82 24999.92 :-9801.65 -15114.39 13353.40	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 00) took 17 -14079.28 18854.64 -15844.51 71.49 15586.40	-24999.96 -24999.86 -24999.76 24999.74 24999.84 24999.94 .9327507019 11427.80 -4952.62 18614.71 9535.58 14164.75	-24999.95 -24999.85 -24999.75 24999.75 24999.85 24999.85 24999.85 24999.95 04297 sec 10122.67 3198.08 629.87 -5013.51 -14686.46	-24999.94 -24999.84 -24999.74 -24999.76 -24999.86 -24999.96 -20129.59 -16145.95 -2249.24 -17672.60 -4038.09	16598.05 -24999.93 -24999.83 -24999.77 24999.87 24999.97 20948.48 1917.16 -24772.9 -14210.32 -21196.88 -20573.27	15278.83 -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98 19547.51 -8479.07 15849.39 1-20801.91 -5948.42 15495.77	-249 -249 -249 249 249 249 -175 -201 -121 238 158
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Ter merges -5000.00 -4999.30 -4999.80 +4999.80 +4999.80 +4999.80 +4999.90 -7899.21 -1290.23 -4891.3518.40 -1838.24 -1838.24 -1838.24 -1838.24 -1999.80 -4999.80 -4999.80 -4999.80 -4999.70 +4999.70 +4999.70	189.53 Sort of L: -4999.89 -4999.79 -4999.71 4999.81 4999.81 18 of list Sort of L 3666.25 -366.63 -2027.52 -2266.73 4884.87 -1264.64 Sort of L: -4999.99 -4999.89 -4999.79 -4999.79 -4999.71	-4999, 98 -4999, 88 -4999, 78 4999, 72 4999, 92 (size=100000 -205, 64 -865, 23 3622, 30 -2192, 29 -1604, 48 -4999, 88 -4999, 78 4999, 78	-4999.97 -4999.87 -4999.73 -4999.83 -4999.93 -4999.93 -60 took 2.1 -4189.26 -787.42 -777.82 -2690.31 -2635.19 -2168.70 -4999.87 -4999.87 -4999.77	-4999, 96 -4999, 76 -4999, 74 -4999, 74 -4999, 94 -4999, 94 -968179630279 -1168, 96 -12247, 62 -1526, 31 -682, 42 -393, 41 -2882, 59 -4999, 86 -4999, 76 -4999, 76 -4999, 74 -4999, 74	-4999, 95 -4999, 75 -4999, 75 -4999, 75 -4999, 85 -4999, 85 -4999, 95 -425, 23 -4212, 81 -499, 85 -4999, 75 -4999, 75 -4999, 75 -4999, 75 -4999, 75 -4999, 75	-2942.40  -4999.94 -4999.84 -4999.76 4999.96  -2676.79 -4342.20 3426.49 1916.56 3892.52 -584.69 -4999.94 -4999.84 -4999.74	-4999.93 -4999.83 -4999.77 -4999.73 -4999.97 -4999.97 -2733.16 -263.57 -3766.57 -3766.57 -4686.31 -1058.38 -4704.71 -4999.93 -4999.83 -4999.73 -4999.87	-4999.92 -4999.82 -4999.72 4999.88 4999.98 3205.27 544.65 3374.53 2824.77 -974.24 3702.43 -4999.82 -4999.82 -4999.72	-4999, 91 -4999, 81 -4999, 71 -4999, 79 -4999, 79 -4999, 89 -1560, 49 -1560,	-8355.77 After merge -2500e.80 -24999.90 -24999.80 -24999.80 -24999.80 -24999.81 -24999.81 -17771.30 -2275.42 -21414.55 After quick -2500e.80 -24999.80 -24999.80	Sort of L: -24999.99 -24999.89 -24999.71 -24999.71 -24999.81 -24999.81 -24999.81 -24999.81 -17359.89 -19367.26 -19317.21 -7212.38 Sort of L: -24999.89 -24999.89 -24999.89 -24999.71 -24999.71	-24999.98 -24999.78 -24999.78 -24999.82 -24999.92 (size=50000 -9801.65 -15114.39 13353.40 -18366.96 -255.84 6713.20 -24999.88 -24999.72 -24999.72	-24999.97 -24999.87 -24999.77 24999.73 24999.83 24999.93 80 ) took 17 -14079.28 18854.64 -15844.51 71.49 15586.40 -19237.02 -24999.87 -24999.77 24999.77	-24999.96 -24999.76 -24999.76 -24999.76 -24999.84 -24999.84 -9327507019 11427.80 -4952.62 18614.71 9535.58 14164.75 -624999.86 -24999.86 -24999.76	-24999.95 -24999.85 -24999.75 24999.85 24999.85 24999.95 84297 sec 10122.67 3198.08 16229.87 -5013.51 -14686.46 -8751.17 -24999.85 -24999.85 -24999.75	1150.87  -24999.94 -24999.84 -24999.74 24999.76 24999.96 20129.59 -16145.95 2249.24 -17672.60 4038.09 19355.54 -24999.84 -24999.84 -24999.74 24999.76	16598.05 -24999.83 -24999.73 -24999.73 -24999.77 -24999.97 -24772.94 -14210.32 -21196.88 -28572.27 -24999.33 -24999.83 -24999.73	15278.83  -24999.92 -24999.82 -24999.72 24999.78 24999.88 24999.98  19547.51 -8479.67 15849.39 -26881.91 -5948.42 15495.77 -24999.78 24999.82 -24999.72	249 249 249 249 249 249 249 249 249 249
Fter merges -5000.00 -4999.30	189.53 Sort of L: -4999.89 -4999.79 -4999.71 4999.81 4999.91 3606.63 -386.63 -2827.52 -2266.73 4884.87 -1264.64 Sort of L: -4999.99 -4999.89 -4999.81	-4999,98 -4999,72 -4999,82 -4999,82 -4999,82 -4999,82 -4999,82 -205,04 -865,23 -3622,30 -2192,29 -1604,48 -4999,88 -4999,88 -4999,88 -4999,72	-4999.97 -4999.87 -4999.87 -4999.83 -4999.93 -4999.93 -4189.26 -787.42 -2990.31 -2635.19 -2635.19 -2698.87 -4999.87 -4999.87 -4999.83	-4999, 96 -4999, 86 -4999, 74 -4999, 84 -4999, 84 -4999, 84 -4999, 84 -4999, 84 -4999, 84 -4999, 86 -4999, 86 -4999, 86 -4999, 87 -4999, 88 -4999, 88 -4999, 88 -4999, 88 -4999, 88 -4999, 88 -4999, 88 -4999, 88 -4999, 88	-4999, 95 -4999, 85 -4999, 85 -4999, 85 4999, 95 59411, sec 225, 23 3816, 59 4212, 81 4493, 17 -3891, 37 -4999, 85 -4999, 85 4999, 85	-2942.40  -4999.94 -4999.84 -4999.76 4999.96  -2676.79 -4342.20 3426.49  1916.56 3892.52 -584.56  -4999.94 -4999.84 -4999.84	-4999, 93 -4999, 83 -4999, 83 -4999, 73 -4999, 87 -4999, 87 -4999, 97 -4686, 31 -4999, 93 -4999, 93 -4999, 93 -4999, 73	-4999.92 -4999.82 -4999.72 -4999.72 -4999.72 -4999.88 -4999.98 -3205.27 -544.66 -3974.53 -2824.77 -974.24 -3702.43 -4999.92 -4999.92 -4999.72	-4999.91 -4999.81 -4999.89 -4999.89 -4999.89 -1566.49 -3846.97 -4747.64 -3346.68 -3466.93 -4999.91 -4999.81 -4999.81 -4999.79	-8355.77  After merge -25080.00 -24999.80 -24999.80 -24999.80 -24999.80 -24999.90 Merge sorti Before quie-19387.94 -21643.35 19427.81 -27771.30 -22275.42 -21414.55 After quick -25080.00 -24999.80 -24999.80 -24999.80 -24999.80 -24999.80	Sort of L: -24999.99 -24999.79 -24999.81 24999.71 24999.81 g of list Ksort of L: -14927.20 -17359.89 -9309.28 19747.06 -19317.21 7212.38 Sort of L: -24999.99 -24999.89 -24999.89	-24999, 98 -24999, 78 -24999, 72 -24999, 82 -24999, 82 -24999, 82 -24999, 82 -155114, 39 -13553, 40 -18366, 96 -255, 84 -6713, 20 -24999, 88 -24999, 88 -24999, 82 -24999, 82 -24999, 82 -24999, 82 -24999, 82	-24999.97 -24999.87 -24999.73 24999.83 24999.93 24999.93 80) took 17 -14079.28 18854.64 -15864.46 -19237.62 -24999.97 -24999.87 -24999.73 24999.83 24999.83	-24999.96 -24999.86 -24999.76 24999.84 24999.84 24999.94 .9327567019 11427.80 -4952.62 18614.71 9535.58 14164.75 16896.13 -24999.86 -24999.86 24999.84 24999.84	-24999, 95 -24999, 75 -24999, 75 -24999, 85 -24999, 85 -24999, 85 -24999, 85 -24999, 85 -24999, 85 -24999, 95 -24999, 85	1150.87  -24999.94 -24999.74 -24999.76 -24999.96 -2499.96  20129.59 -16145.95 -2249.24 -17672.60 4038.09 19355.54 -24999.94 -24999.84 -24999.76	16598.65  -24999.83 -24999.73 24999.77 24999.87 24999.97  -24994.48 1917.16 -24772.94 -14218.32 -21196.88 -20573.27 -24999.83 -24999.83 -24999.77	15278.83 -24999.92 -24999.72 24999.72 24999.78 24999.88 24999.98 19547.51 -8479.07 15849.39 -20881.91 -5948.42 15495.77 -24999.92 -24999.82 -24999.78	163 -249 -249 -249 249 -175 -201 -121 238 -172 -249 -249 -249

# (3) 결과물 제출

- 파이썬 소스코드 (Exam2D\_학번\_성명.py)
- 실행 결과 (capture된 이미지) (Exam2D실행결과\_학번\_성명.png)

## (4) 본인 응시 및 사용 컴퓨터 IP 주소 확인을 위한 동영상 파일 2차 제출 !!