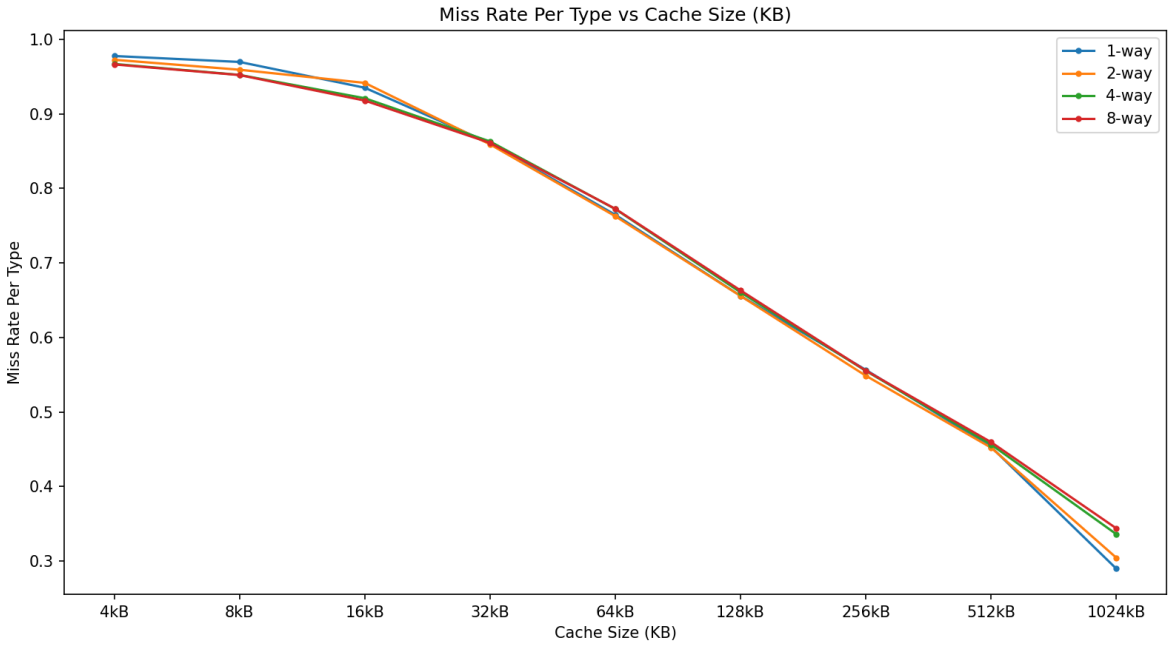
Assignment 1

Shubham Sharma, 2021099

2) b)



Associativity	Size	Miss Rate	Tick
1	4 kB	0.977630	70622761000
1	8 kB	0.969678	70517724000
1	16 kB	0.935068	70139663000
1	32 kB	0.860697	69318523000
1	64 kB	0.764652	68208739000
1	128 kB	0.655861	66958180000
1	256 kB	0.556605	65758214000
1	512 kB	0.453198	64420155000
1	1024 kB	0.289863	62465827000

2	4 kB	0.972609	70570956000
2	8 kB	0.959232	70436648000
2	16 kB	0.941584	70221846000
2	32 kB	0.859095	69287240000
2	64 kB	0.762692	68193049000
2	128 kB	0.655747	66953293000
2	256 kB	0.548725	65668347000
2	512 kB	0.452269	64439823000
2	1024 kB	0.304527	62647698000
4	4 kB	0.966998	70522297000
4	8 kB	0.952293	70357737000
4	16 kB	0.920995	70011558000
4	32 kB	0.863008	69353075000
4	64 kB	0.772305	68294145000
4	128 kB	0.660673	67017727000
4	256 kB	0.555229	65744773000
4	512 kB	0.456516	64504224000
4	1024 kB	0.336152	63035703000
8	4 kB	0.966337	70505967000
8	8 kB	0.952091	70338733000
8	16 kB	0.917832	69960521000
8	32 kB	0.861054	69321930000

8	64 kB	0.772686	68294145000
8	128 kB	0.663175	67036848000
8	256 kB	0.555670	65755670000
8	512 kB	0.459643	64533229000
8	1024 kB	0.343943	63120467000

2) c)

Observation & Explanation

I observed cache size and associativity have significant effects on cache performance.

- As the size of the cache increases, the miss rate will gradually decrease because the larger cache holds more data and increases the chance that the requested data is already present in the cache, which reduces the miss rate and increases the CPU efficiency.

- Also, an increase in the associativity of the cache will lead to better handling of conflicts and reduce the miss rate. Higher associativity allows more flexibility in placing data within the cache.

- I observed larger caches with higher associativities generally yield better performance by reducing miss rates
  Ex:- Miss rate of Associativity = 8, Size = 512kB is less as compared to Associativity = 1, Size = 4kB.