Adrien Protzel | protzela | protzela@oregonstate.edu
Curtiss Haldorson | haldorsc | haldorsc@oregonstate.edu

1. Code
2.
    a. 10 buffers = improving block based nested loop join = [200080000]

R	80000		Nested loop join	1600080000	TRUE	improving block based nested loop join
S	20000		block based nested loop join	1600080000	TRUE	200080000
M	10		improving block based nested loop join	200080000	TRUE	
			sort merge join	800000	FALSE	
sort R	240000	FALSE	optimized sort merge join	300000	FALSE	
sort S	60000	FALSE	in memory hash join	300000	FALSE	

    b. 350 buffers = optimized sort merge join / hash join = [300000]

R	80000		Nested loop join	1600080000	TRUE	optimized sort merge join
S	20000		block based nested loop join	1600080000	TRUE	in memory hash join
M	350		improving block based nested loop join	4677701.149	TRUE	300000
			sort merge join	800000	FALSE	
sort R	240000	TRUE	optimized sort merge join	300000	TRUE	
sort S	60000	TRUE	in memory hash join	300000	TRUE	

    c. 200 buffers = improving block based nested loop join = [8160808.081]

R	80000		Nested loop join	1600080000	TRUE	improving block based nested loop join
S	20000		block based nested loop join	1600080000	TRUE	8160808.081
M	200		improving block based nested loop join	8160808.081	TRUE	
			sort merge join	800000	FALSE	
sort R	240000	FALSE	optimized sort merge join	300000	FALSE	
sort S	60000	TRUE	in memory hash join	300000	FALSE	

3. Find fastest join in natural join, show proof
    a. Block-based NL is most likely since hash and sort merge are not applicable
        i. The larger relation will greatly increase a merge cost, and so sort merge and hash are not applicable.
    b. Clustering will reduce the indexes which could allow alternate (Index NL) joins