Compute Initial Potential

The starter code gives the functions to create the clique tree from the factors. The clique tree contains the following:

1. nodes – The list of cliques
2. edges – The adjancency matrix for the clique tree
3. factorList – The factors for which the clique tree is made
4. card – Cardinality of the union of the scope of all factors

Problem statement:

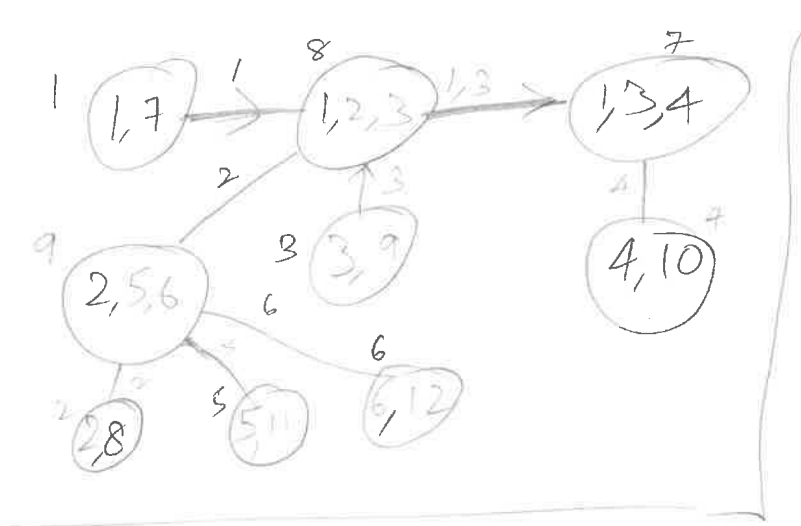
Create the cliqueList with the potentials for each clique as a product of the initial factors. i.e. allocate each factor to a clique and maintain family preservation. No checks for running intersection is made in this function.

Method:

1. Draw the clique tree. See page-3
    - The tree shows the cliques & their scopes.
    - The number to the top of the circle is the node id.
    - The numbers next to the edge correspond to the sepset between adjancent cliques.
    - The number underlined is the factor that is marginalized during message passing.
2. Starting from the leaves, allocate factors to the nodes so that all factors that contain the marginalized factor in their scope are allocated to that node.
3. [Optional] Allocate all factors whose scope is a subset of a leaf to the leaf. This optional line is necessary to pass the assignment, even though solutions without this step are also correct.
4. Remove the leaf from the tree once all factors to the leaf are allocated and proceed to step-2.

Following this leads to the list of factors shown in Page-4. The list of factors in page-4 does not include step-3.

5. If more than 1 factor is allocated to each node, perform a factor product over all factors and call this intermediate factor.
6. Note that the union of the scopes of all factors allocated to a node is only a subset of the scope of the node. This is because of the addition of fill-edges. For all variables in the scope of the node that are not present in any of the factors, create a new factor over these variables and set the potentials to unity (1.0).
7. Perform a factor product of the unity factor with the intermediate factor to get the initial potential for that node.



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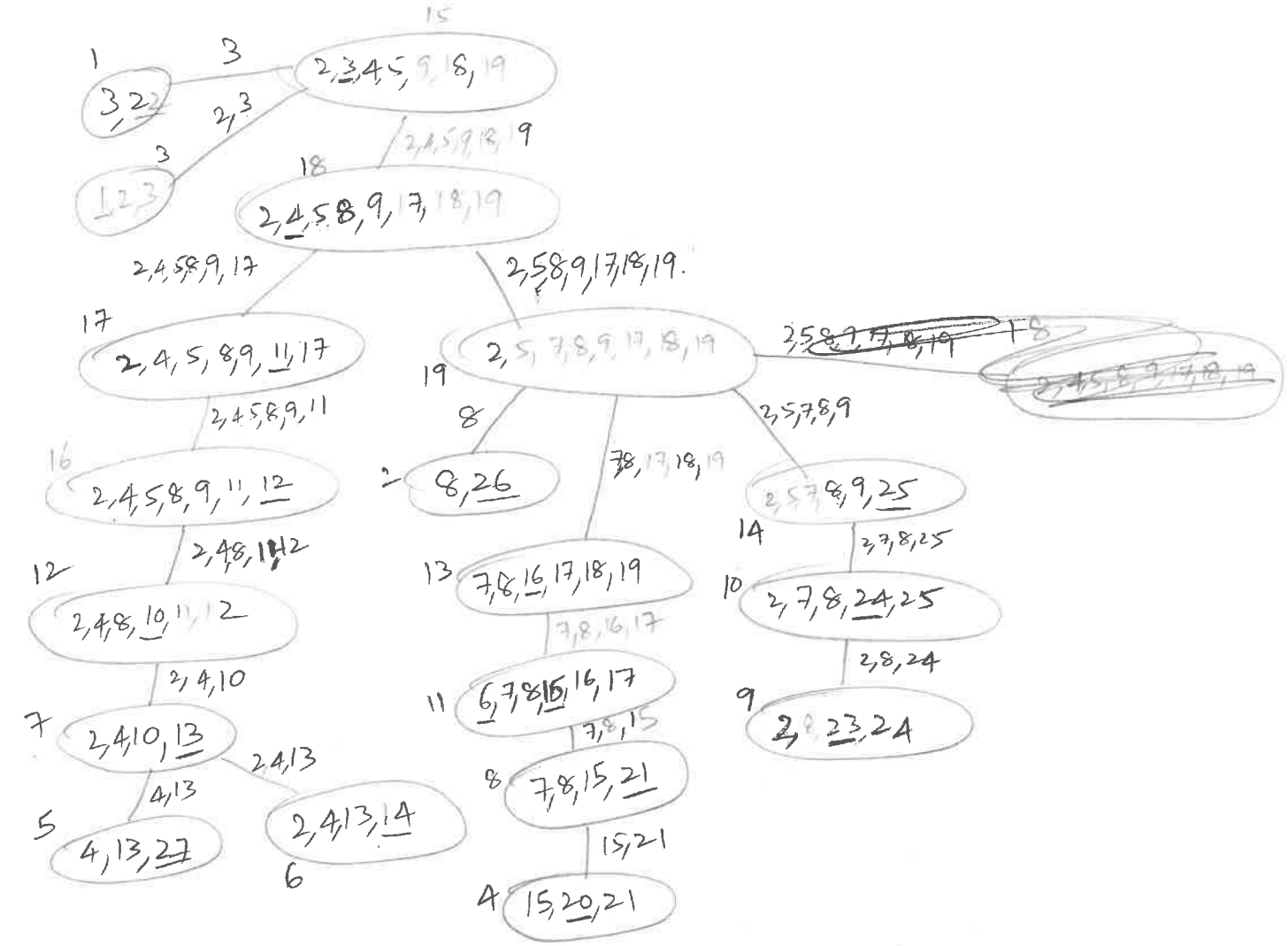

Not eliminated 2,5,7,8,9,17,18,19

Node	Scope	Factor	Factor #	Unused
1	3,22	22 3	22	1,3,4,11
2	8,26	26,8	26	
3	1,2,3	1,3,2	2	
4	15,20,21	15,20,21	20	
5	4,13,27	4,13,27	27	
6	2,4,13,14	[2,4,14] [2,13,14]	14,13	
7	2,4,10,13	4,10,13	10	
8	7,8,15,21	[7,8,21]	21	
9	2,8,23,24	[2,8,23,24]	23	
10	2,7,8,24,25	[7,24,25]	24	
11	6,7,8,15,16,17	[6,7,8], [15,6,17,16]	6,15	
12	2,4,8,10,11,12	[8,12,11,10]	8	
13	7,8,16,17,18,19	[16,17,18,19],	16	
14	2,5,7,8,9,25	[5,9,25] [4,3,9]	25	
15	2,3,4,5,9,18,19	[3,4,5] [3,4,18] [3,4,19], [2,3,4]	4,18,19,5,9	
16	2,4,5,8,9,11,12	[12,9,5]	12	
17	2,4,5,8,9,11,17	[5,9,11,17]	17	
18	2,4,5,8,9,17,18,19	?		
19	2,5,7,8,9,17,18,19	[5,7,9]	7,	