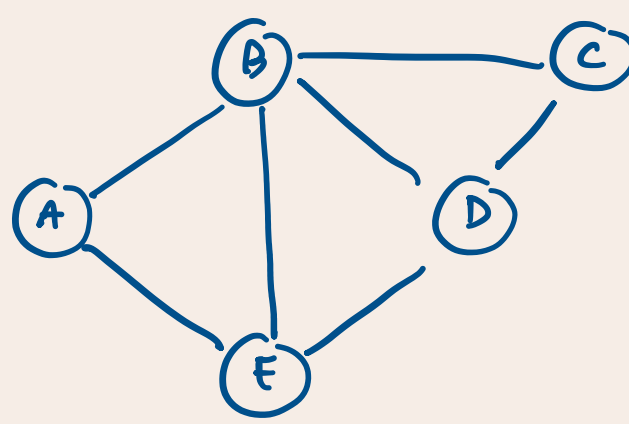


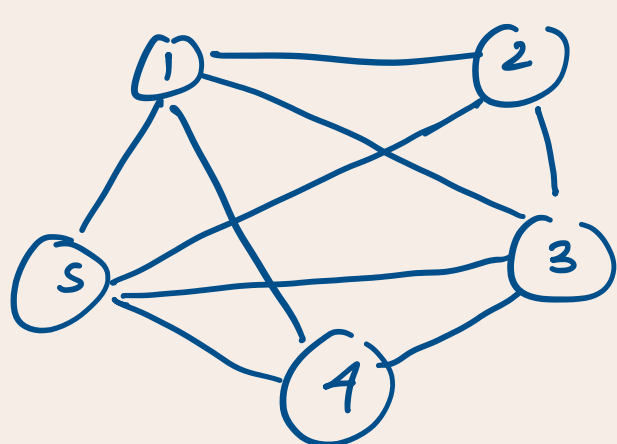
1) $A \ B \ C \ D \ E$

| | | | | | |
|-----|---|---|---|---|---|
| A | 0 | 1 | 0 | 0 | 1 |
| B | 1 | 0 | 1 | 1 | 1 |
| C | 0 | 1 | 1 | 1 | 0 |
| D | 0 | 1 | 1 | 0 | 1 |
| E | 1 | 1 | 0 | 1 | 0 |

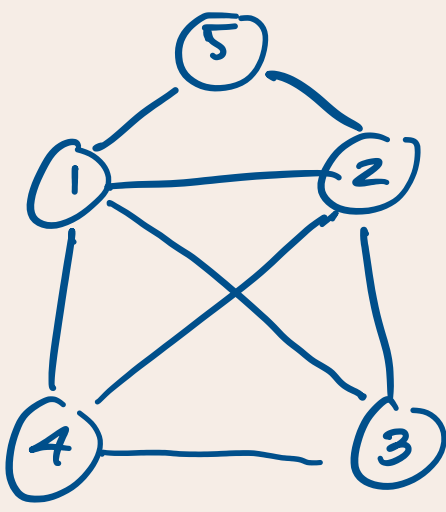


2) A simple graph is only achievable when the sum of degrees is an even number

2a) $5 + 2 + 3 + 2 + 1 = 16$



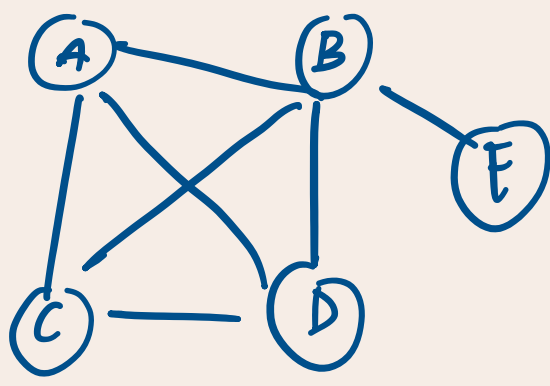
2b) $1 + 4 + 3 + 2 + 3 = 16$



2c) $3 + 3 + 2 + 3 + 2 = 13$

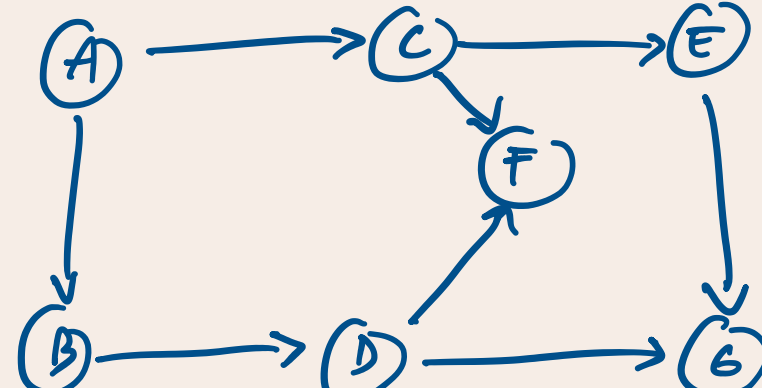
- cannot because odd number,
a node wouldn't be able to exist in the graph

2d) $4 + 4 + 1 + 3 + 2 = 17$

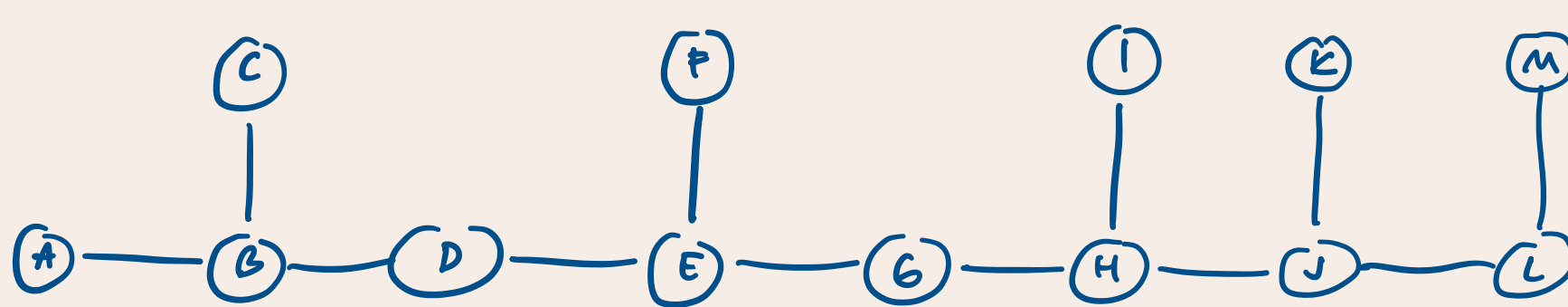
3) $A \ B \ C \ D \ E \ F \ G$

| | | | | | | | |
|-----|---|---|---|---|---|---|---|
| A | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| B | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| C | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| D | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

3a)

3b) $[A] - B - C$ $[B] - C - D - E$ $[C] - E - F$ $[D] - F - G$ $[E] - G$ $[F]$ $[G]$

4)



si) - diagonal entries will be zero.

- sum of entries in any row or column which are equal to the degree of corresponding vertex.

sii) - since no loops, the sum of entries in any row of the incidence matrix of G is equal to the degree of corresponding vertex

siii) - since no loops, the sum of entries in any column represents the number of vertices incident to the corresponding edge

b) adjacency matrix

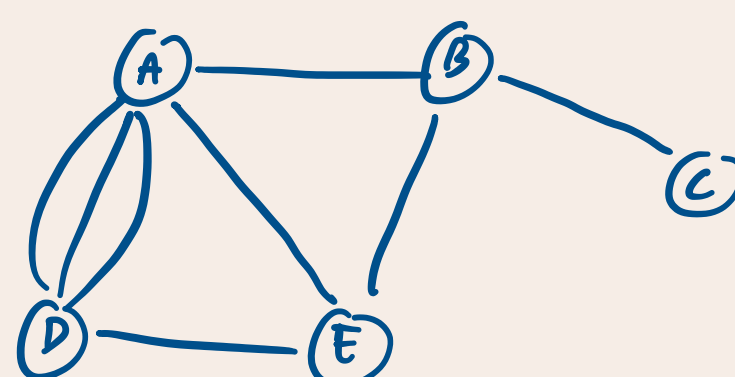
incidence matrices

| | | | | | |
|-----|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 |
| 1 | 0 | 1 | 0 | 0 | 1 |
| 2 | 1 | 0 | 1 | 0 | 1 |
| 3 | 0 | 1 | 0 | 1 | 0 |
| 4 | 0 | 0 | 1 | 0 | 1 |
| 5 | 1 | 1 | 0 | 1 | 0 |

| | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|
| | e_1 | e_2 | e_3 | e_4 | e_5 | e_6 | e_7 |
| v_1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| v_2 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| v_3 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| v_4 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| v_5 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |

7)

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| B | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| D | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| E | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |



Pi) No, not possible

8ii) $2 + 3 + 3 + 1 + 5 + 5 = 22$

