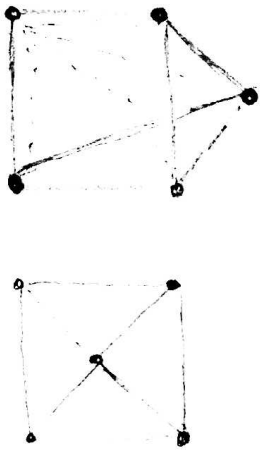
(7)



Adding another edge to satisfy the 3-regular graph property would make one vertex be of degree 4

there is not a 3-regular graph on 5 vertice

More formally using the degree sum formula

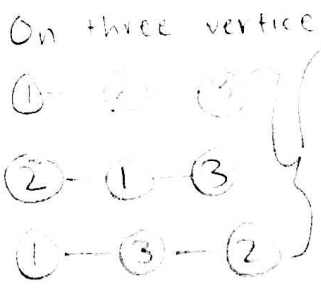
$2|E| = \sum_{v \in V} \deg(v)$ we can show that it is not possible

$2(7) = 3+3+3+3+3$

$2(7) \neq 15$

(8)

On three vertices



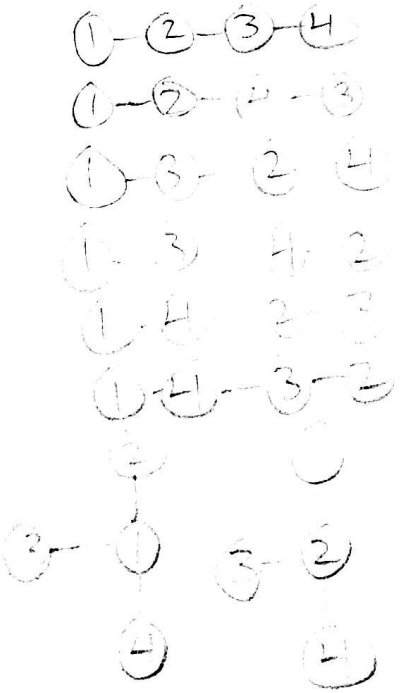
213
312
132
231

there are the three possible trees

123
132
213
231
321
312

$3 \cdot 2 \cdot 1 = \frac{6}{2}$

on four vertices



$4 \cdot 3 \cdot 2 \cdot 1 = \frac{24}{2}$

$\frac{4!}{2!}$

16 possible trees on 4 vertices

Oscar Farris