Joining Extended Star Graphs

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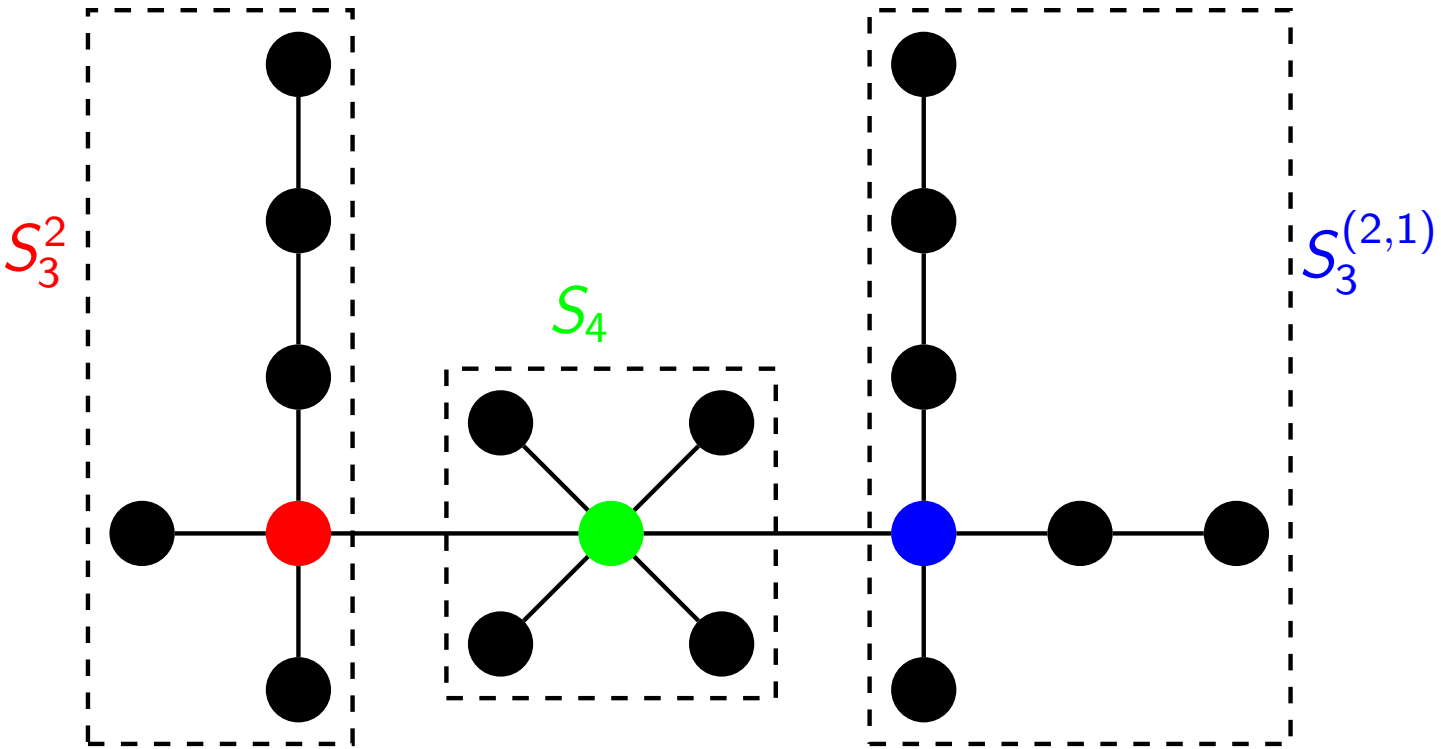
Example of Theorem Applied to joined extended star graphs

3 extended star graphs joined linked by the centers.



Example of Theorem Applied to joined extended star graphs

As the values of the star graphs joined together are

$$V(S_3^2) = \frac{m}{10} \text{ when } m \geq 6$$
$$V(S_4) = \frac{m}{8} \text{ when } m \geq 2$$
$$V(S_3^{(2,1)}) = \frac{m}{12} \text{ when } m \geq 6$$

To join these together by the centres we will require that $6 \leq m \leq 8$ (hence none of the individual extended star graphs values are invalid), then we will get a value of $V = \frac{m}{30}$. This is achieved by the attacker attacking as they would on individual graphs and the patroller playing on these 3 graphs with the probabilities $\frac{10}{30}, \frac{8}{30}, \frac{12}{30}$ respectively.

Problem with joining

The problem with this type of joining is the fact of requiring $m \leq 2\left(n_i + \sum_j (V_j)_i\right)$.
This is required as otherwise, time is wasted by the patroller when they can be certain that the attacker is not there. Consider the fact that they are m away from the end and they then check all points, then they can move away from the graph and possibly catch some other attacks on other joined extended star graphs.