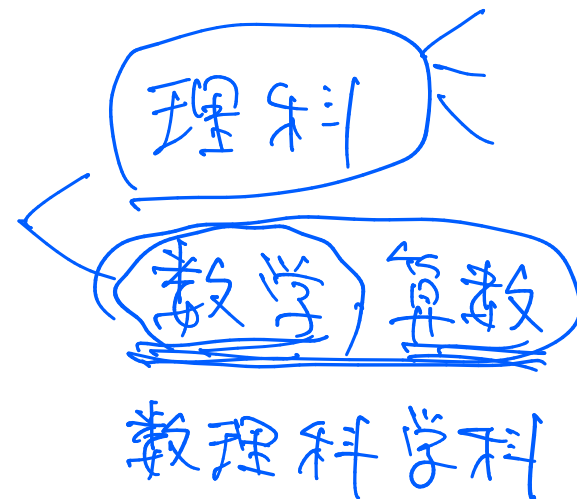


2022 夏休みジュニア科学教室

# ストロー多面体を編もう

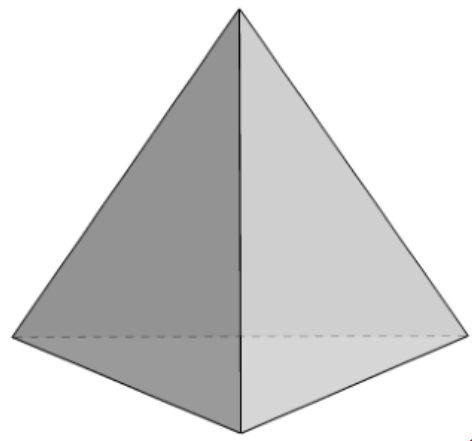
山口大学理学部  
廣澤史彦



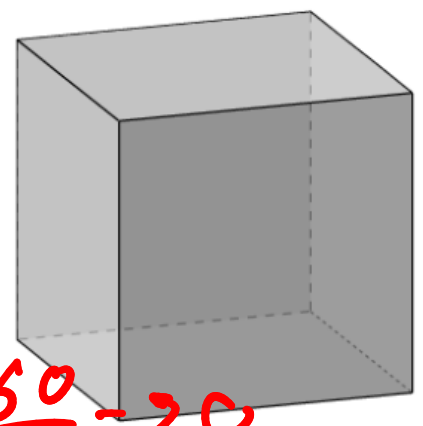
# 1. 多面体

# 正多面体

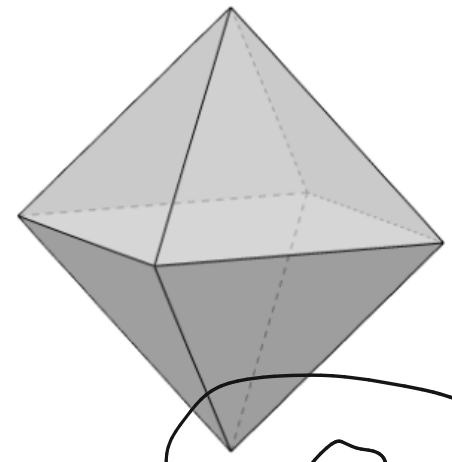
正四面体



立方体(正六面体)



正八面体



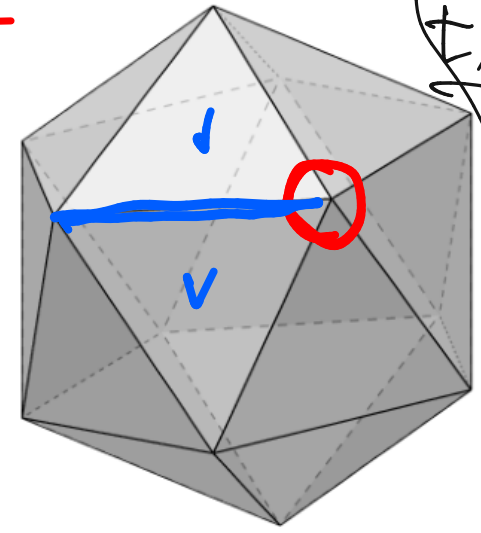
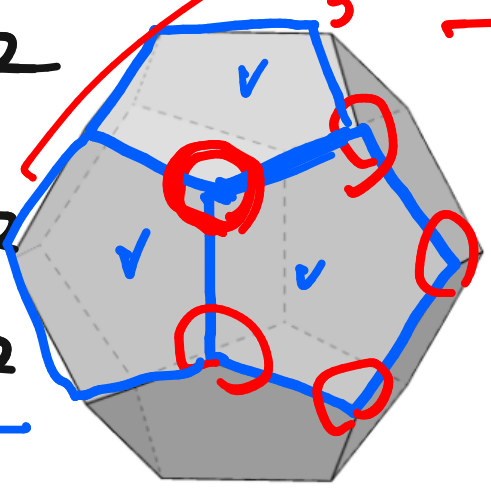
5角形  $\times 12$

顶点 5  $\times 12$

边 5  $\times 12$

$$\frac{60}{3} = 20$$

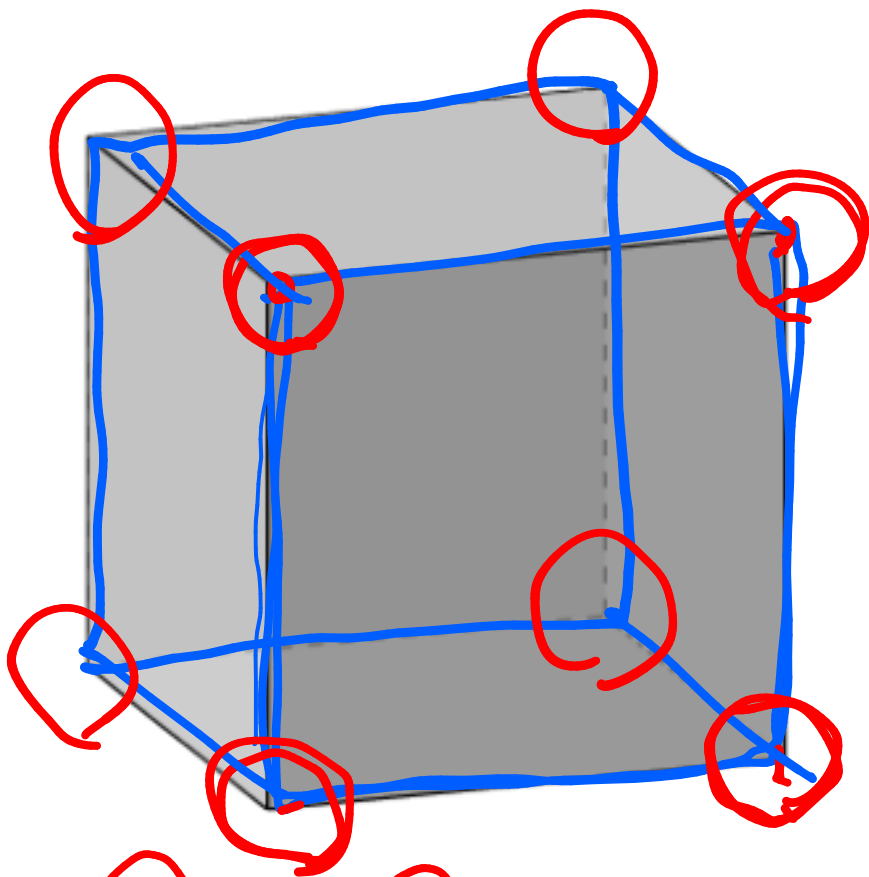
$\frac{60}{2} = 30$  正十二面体



正二十面体

切(頂)二十面体

# 面·边·顶点



面【face】

6

边【edge】

12

顶点【vertex】

8

正六面体(立方体)

【regular hexahedron (cube)】

6

# 正多面体の面・辺・頂点の数

名前	正四面体	正六面体	正八面体	正十二面体	正二十面体
name	regular tetrahedron	regular hexahedron	regular octahedron	regular dodecahedron	regular icosahedron
面の数 (F)	4	6	8	12	20
辺の数 (E)	6	12	12	30	30
頂点の数 (V)	4	8	6	20	12

②

②

②

②

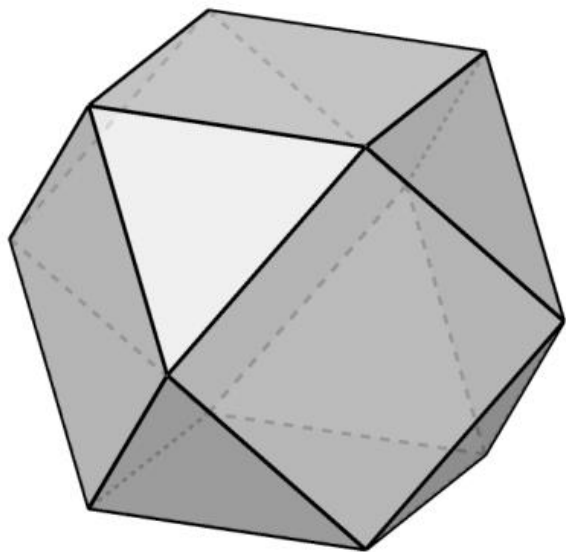
②

$$\underline{F - E + V} = F + V - E$$

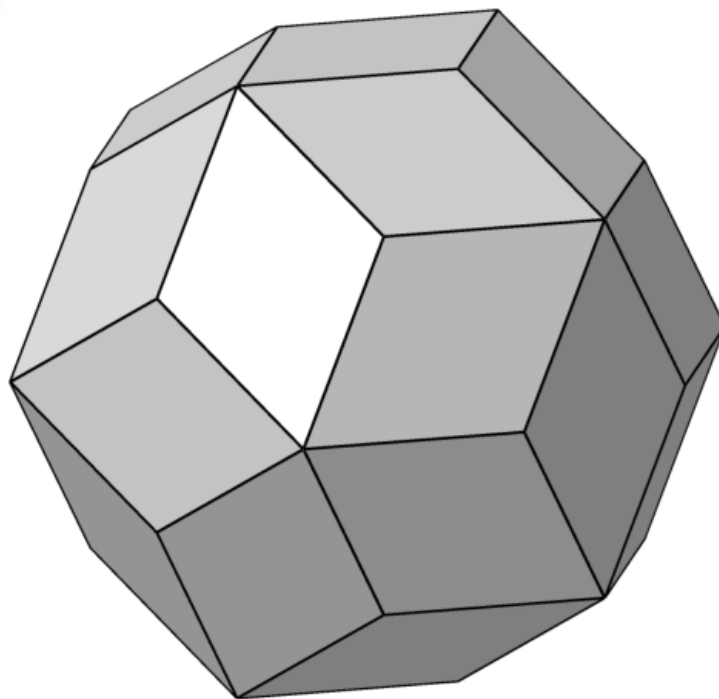
(面)
(頂)
(辺)

オイラー-ポリア多面体定理

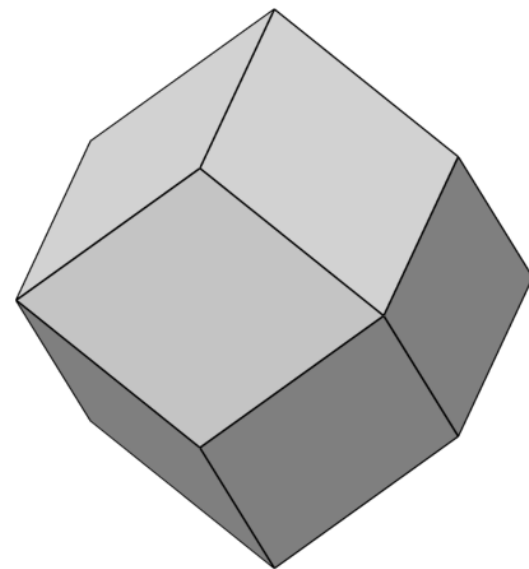
# 多面体いろいろ



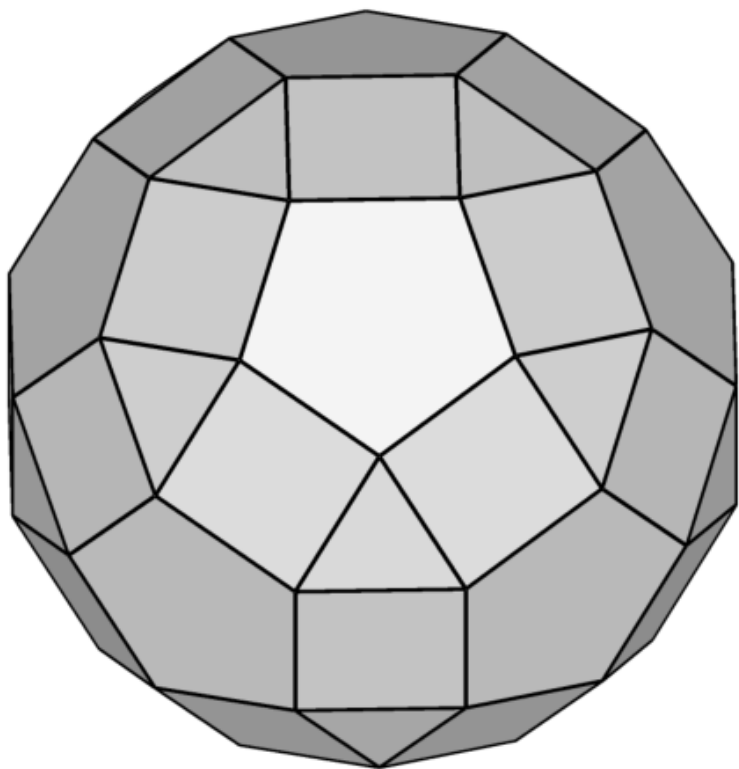
立方八面体



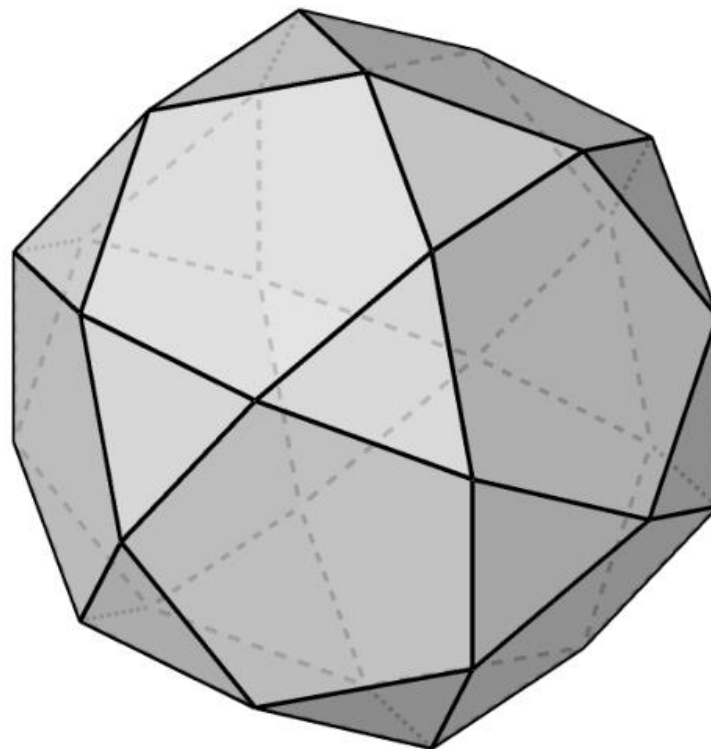
菱形三十面体



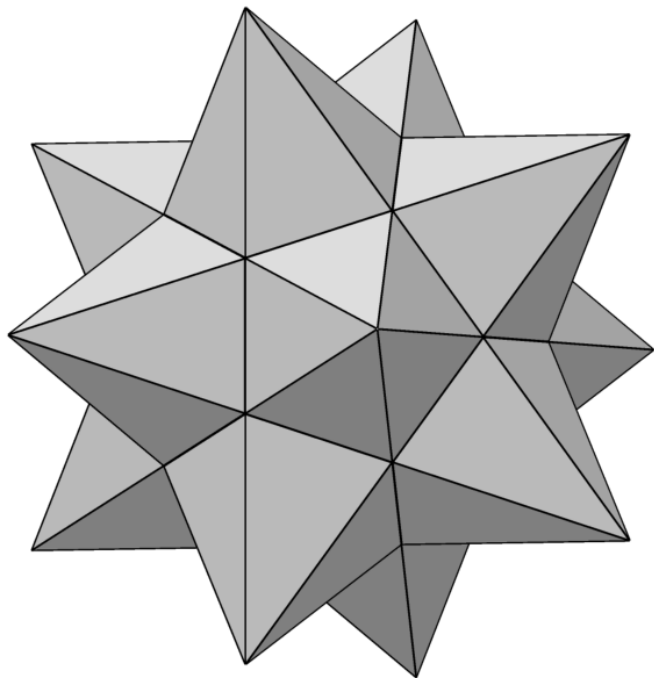
菱形十二面体



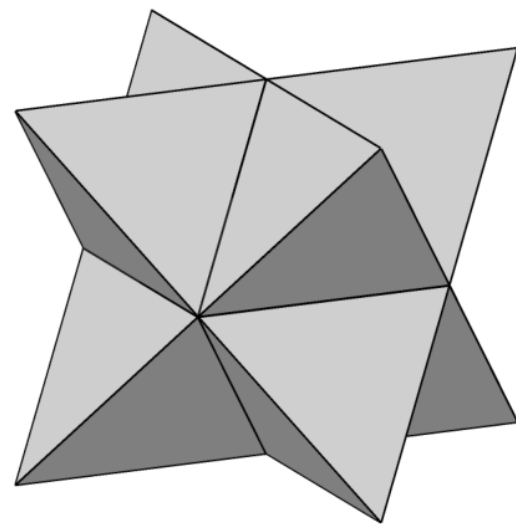
斜方二十·十二面体



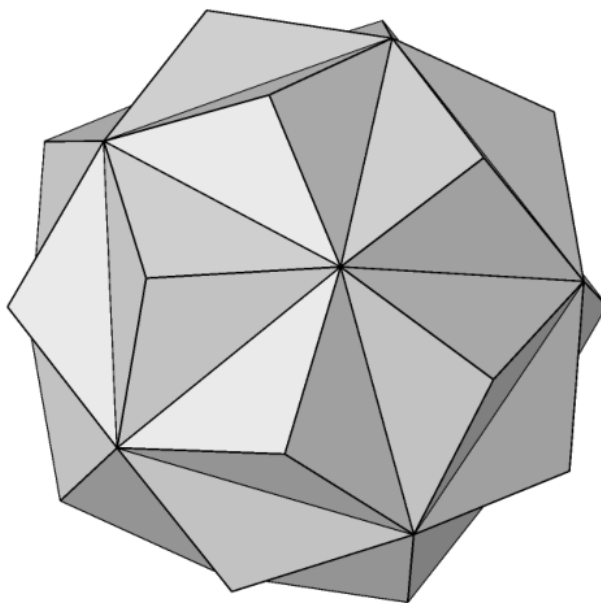
二十·十二面体



小星型十二面体

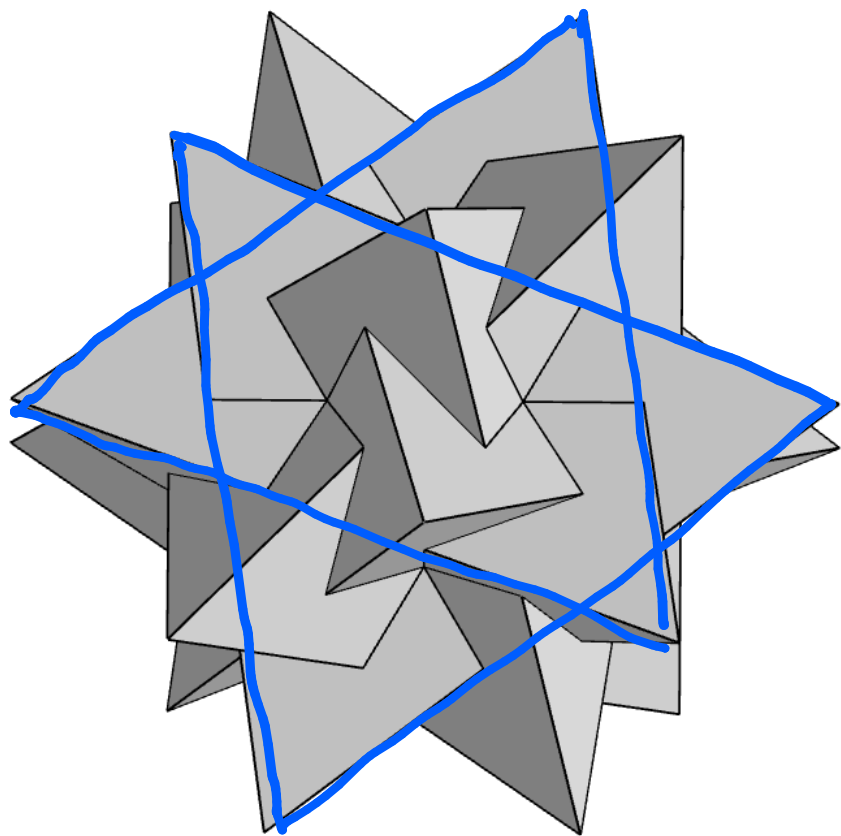


星形八面体

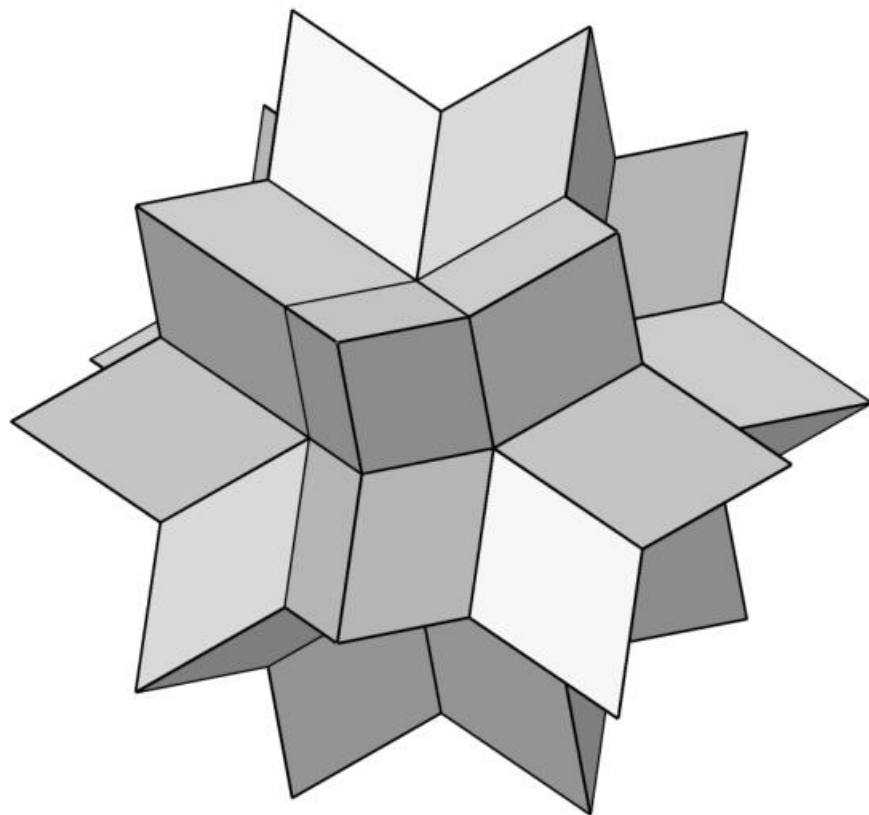


星形二十面体  
(小三角六边形二十面体)

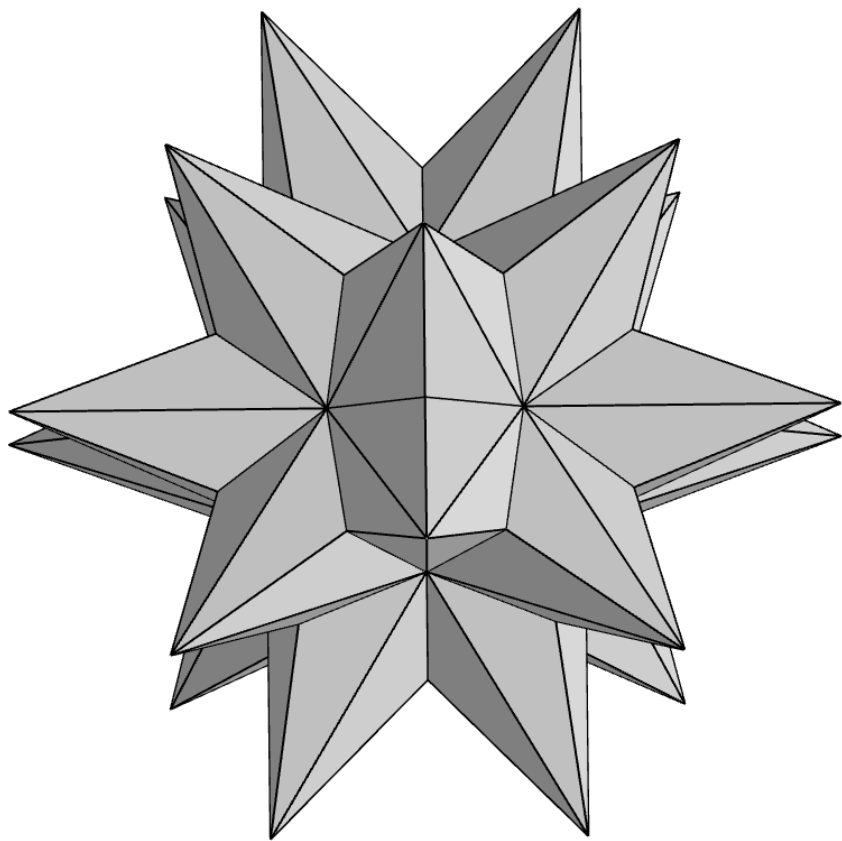




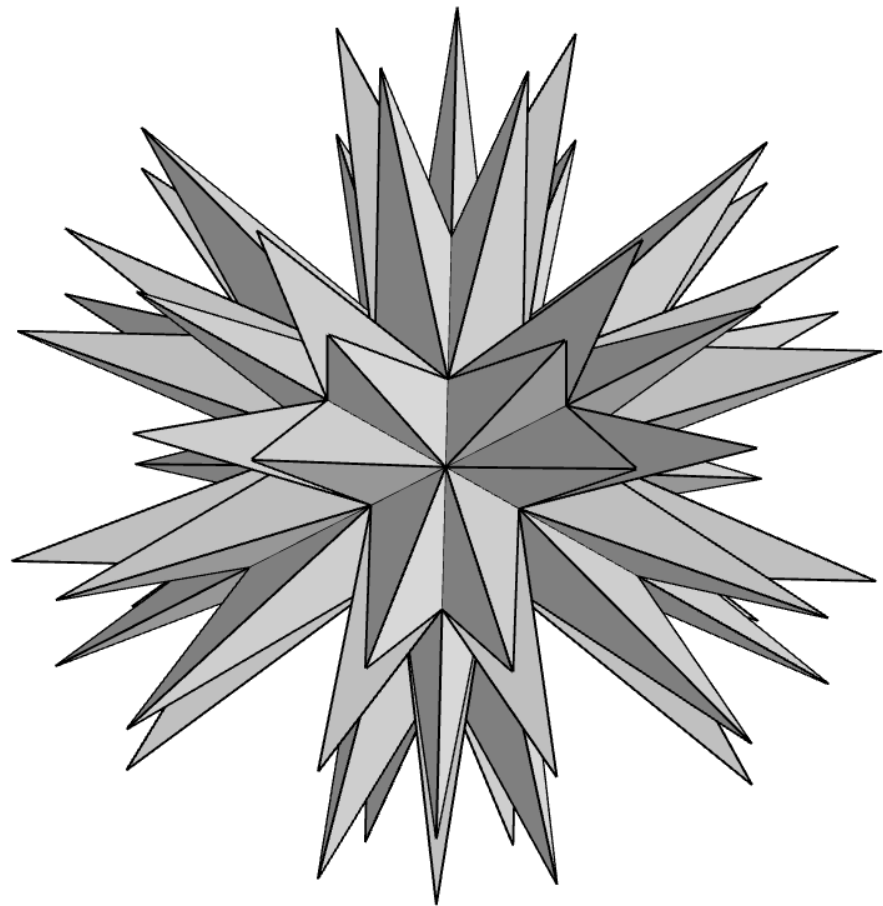
五複合正四面体



菱形六十面体



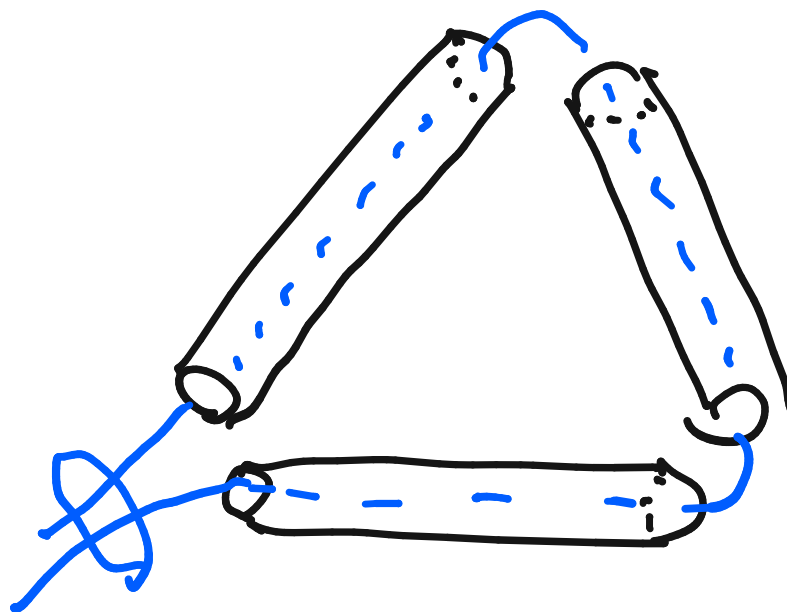
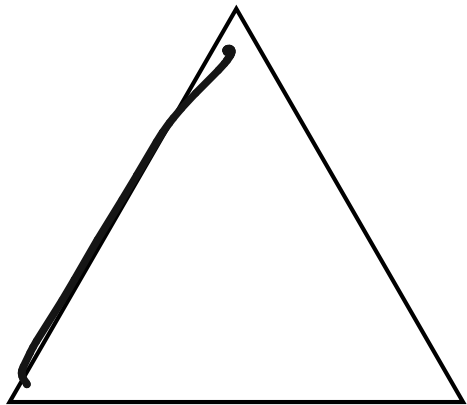
第七種星型二十面体



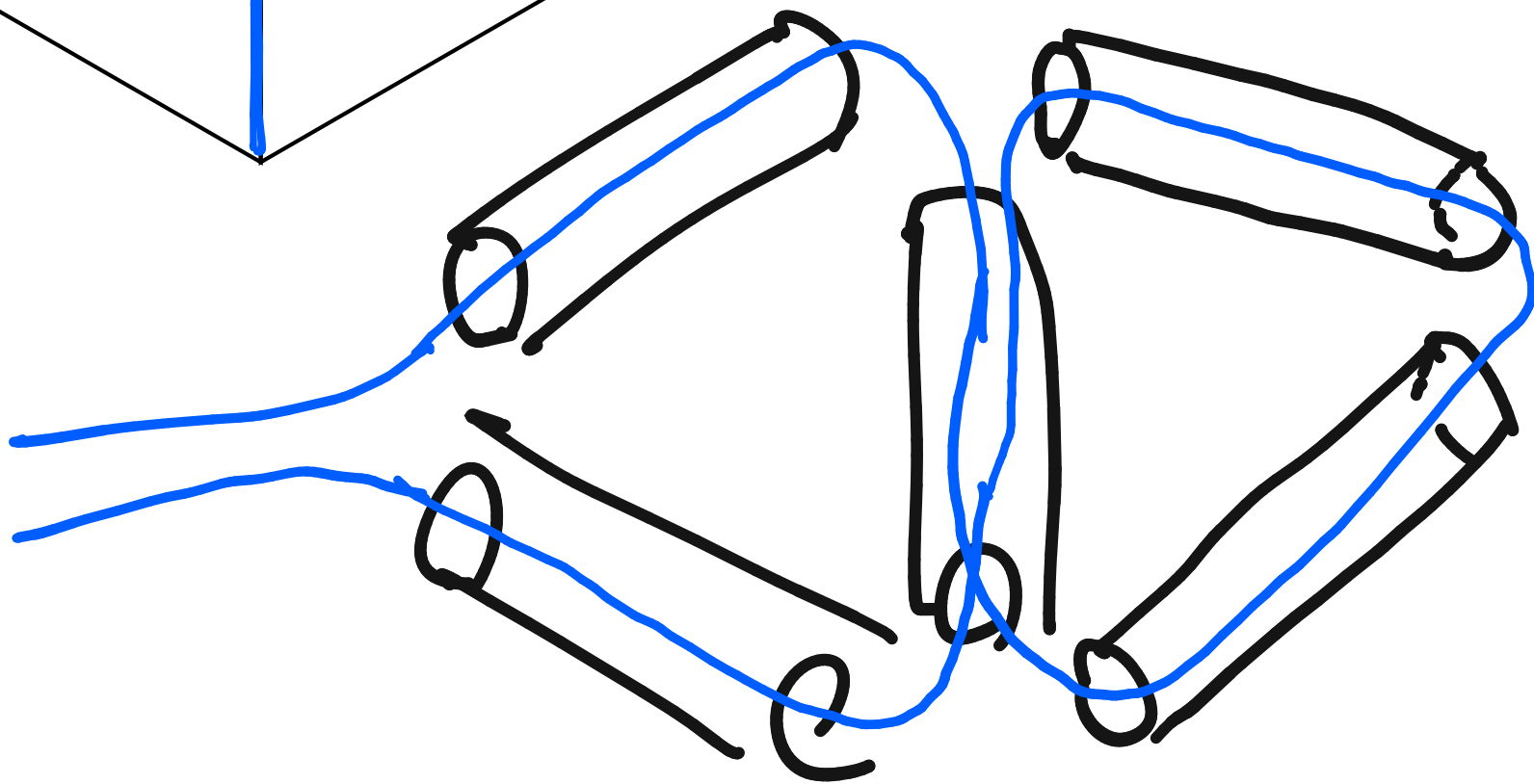
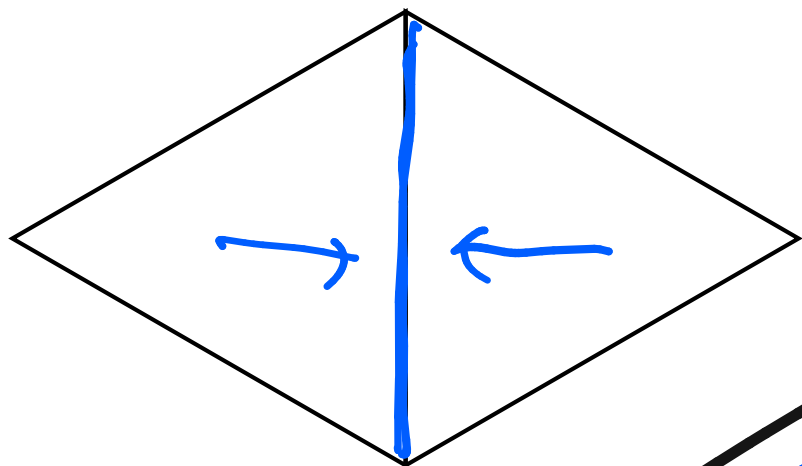
完全星型二十面体

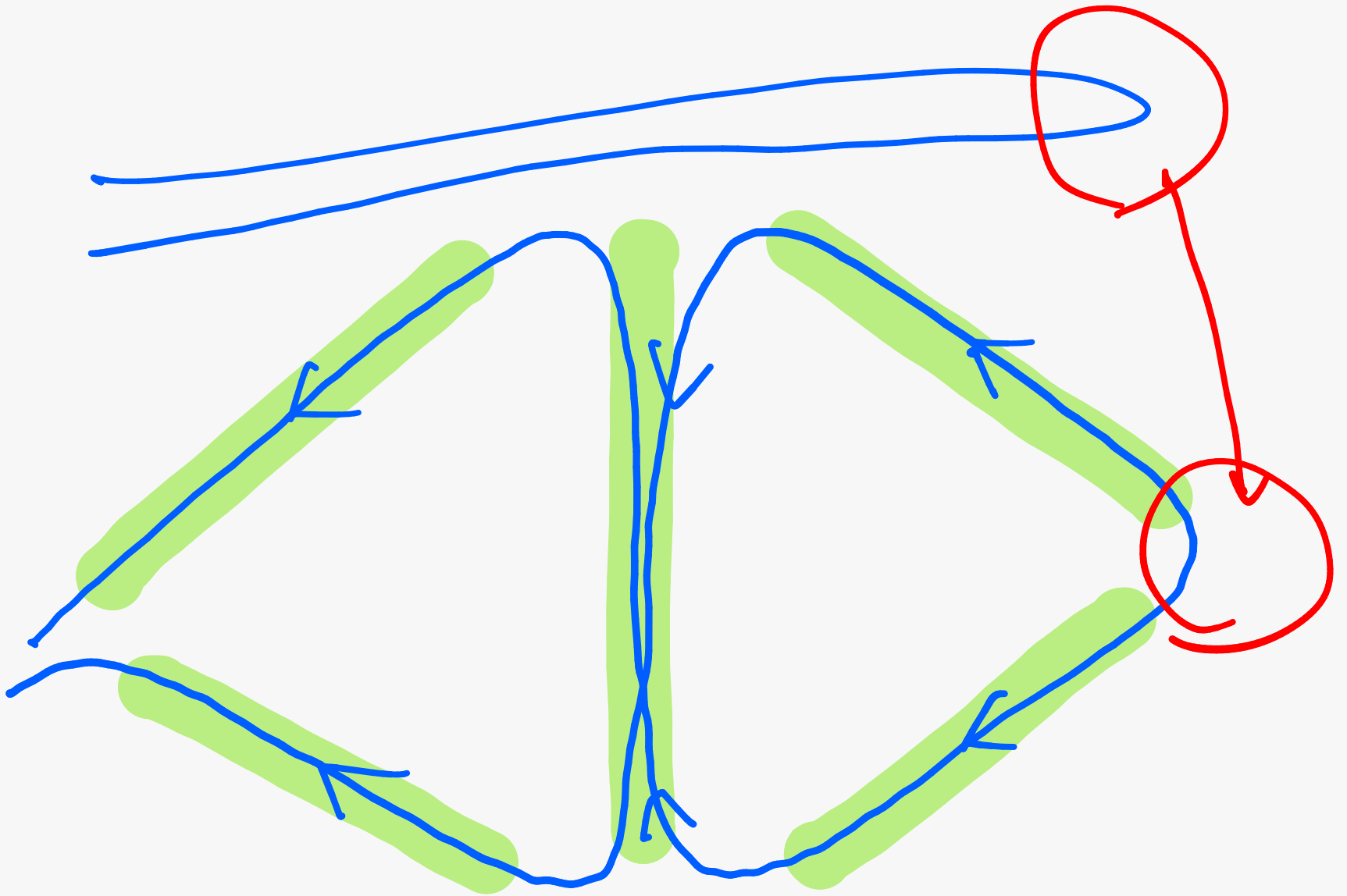
## 2. 面を編む

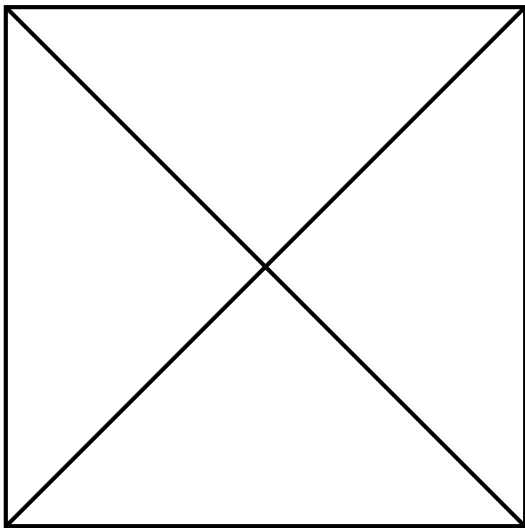
# 三角形を編む

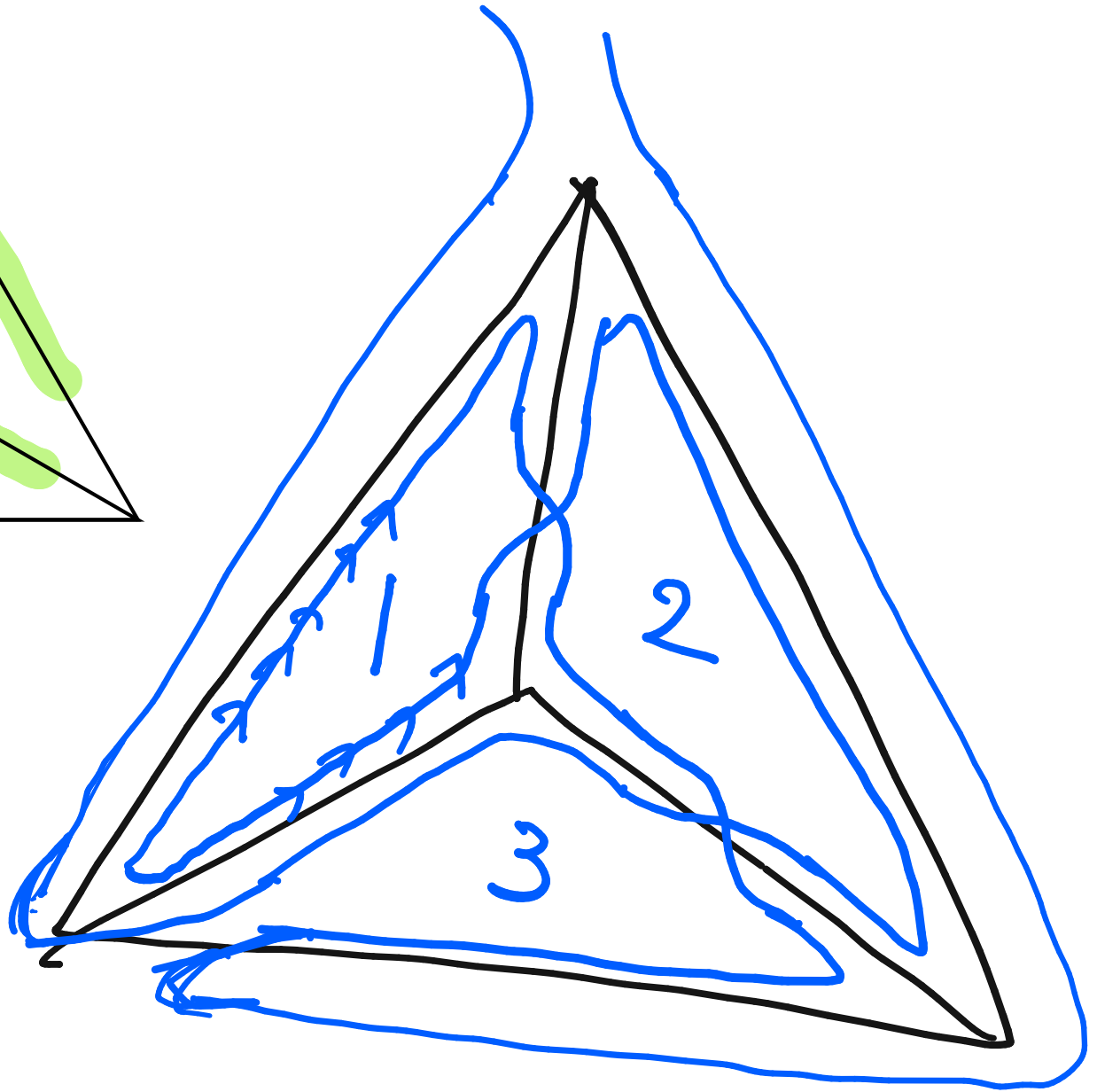
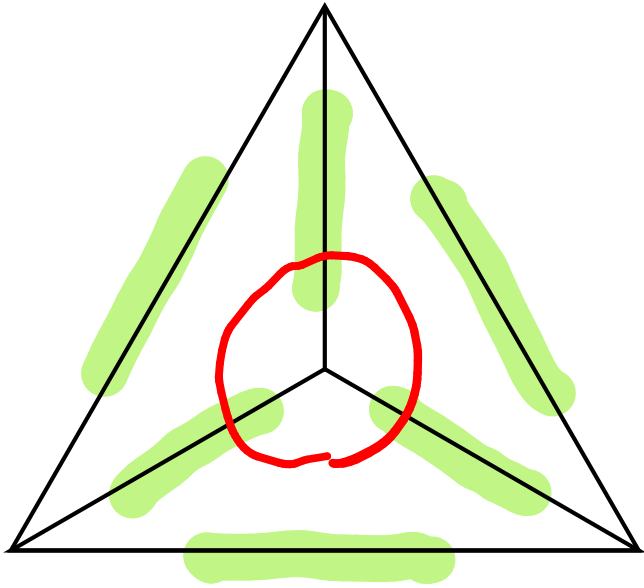


# 複数の面を編む



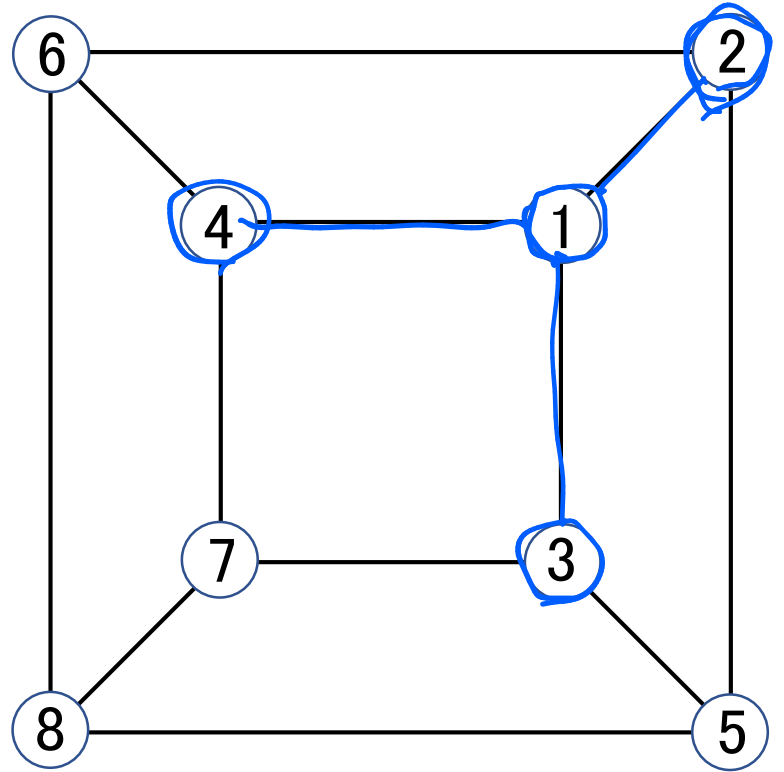
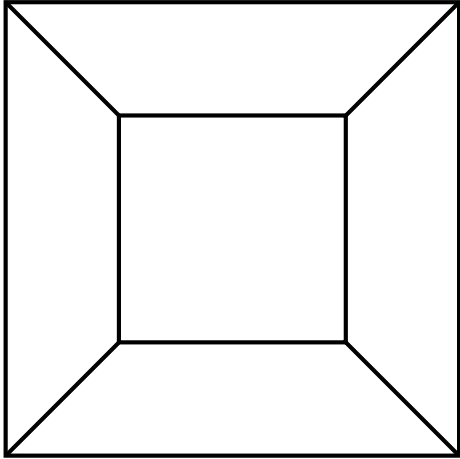




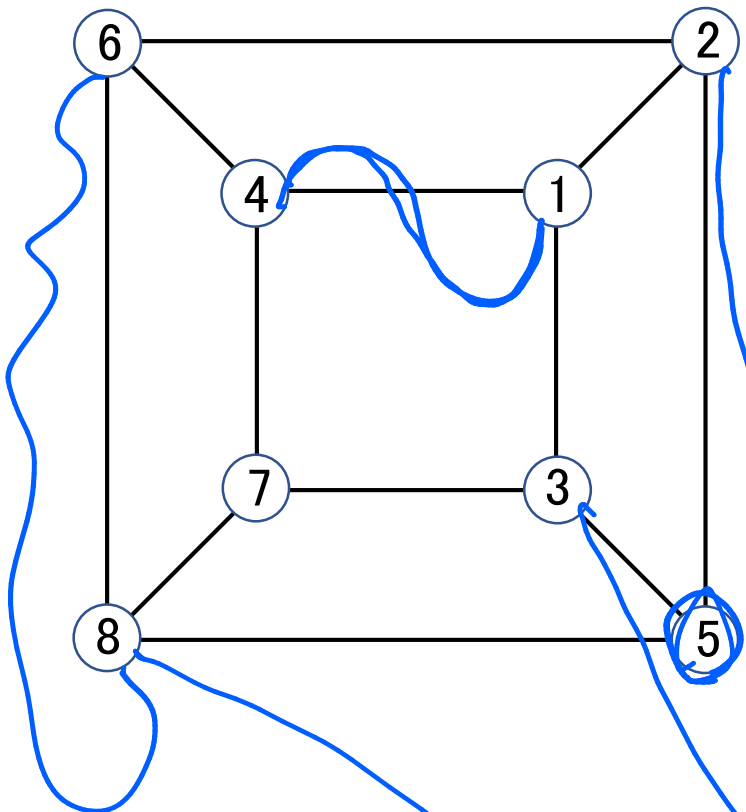




# 3. 多面体のグラフ



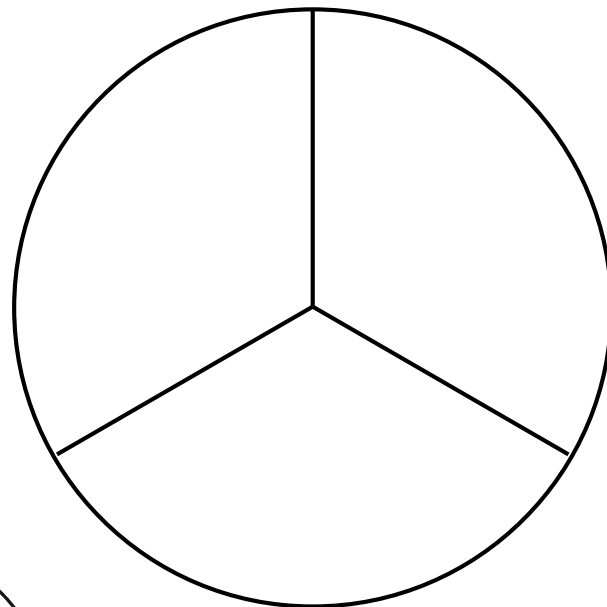
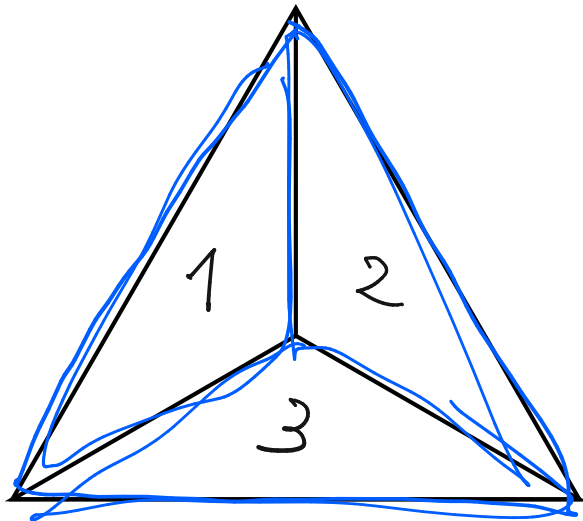
	1	2	3	4	5	6	7	8
1		○	○	○				
2	○				○	○		
3	○				○		○	
4	○					○	○	
5		○	○					○
6		○		○				○
7			○	○				○
8					○	○	○	



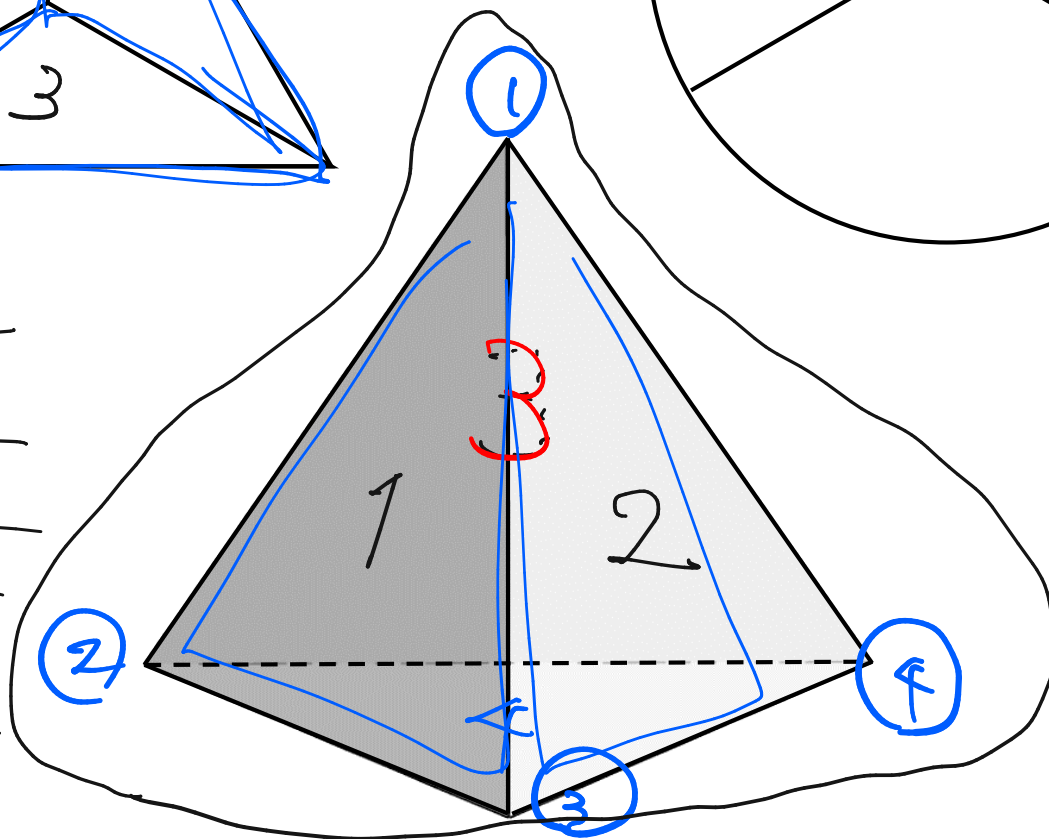
	1	2	3	4	5	6	7	8
1		○	○	○				
2	○				○	○		
3	○				○		○	
4	○					○	○	
5		○	○					○
6		○		○				○
7			○	○				○
8					○	○	○	

- **点(頂点)**同士を**線(辺)**で結んだ上左図のような図形を「グラフ」という。
- グラフの辺は曲がっていてもよい。
- **頂点の位置や辺の長さが異なっても**、上右図のような**頂点と辺の関係の表が等しいとき**、グラフは同一であるとみなす。

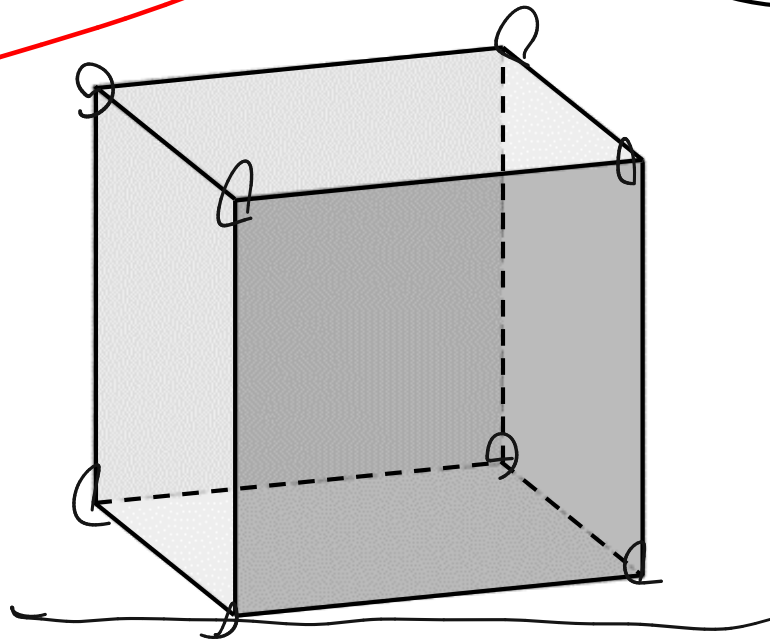
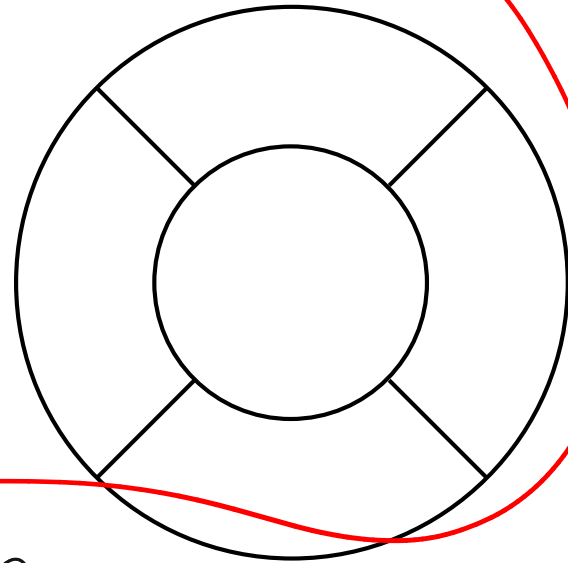
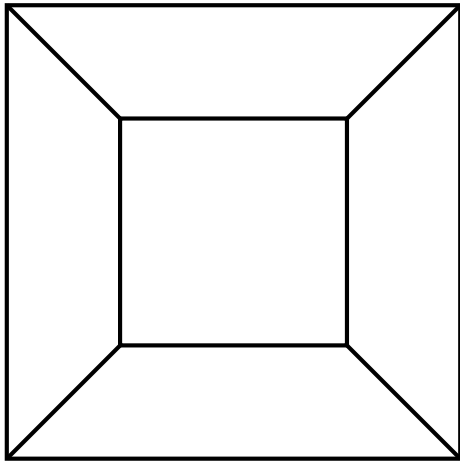
# 正四面体のグラフ



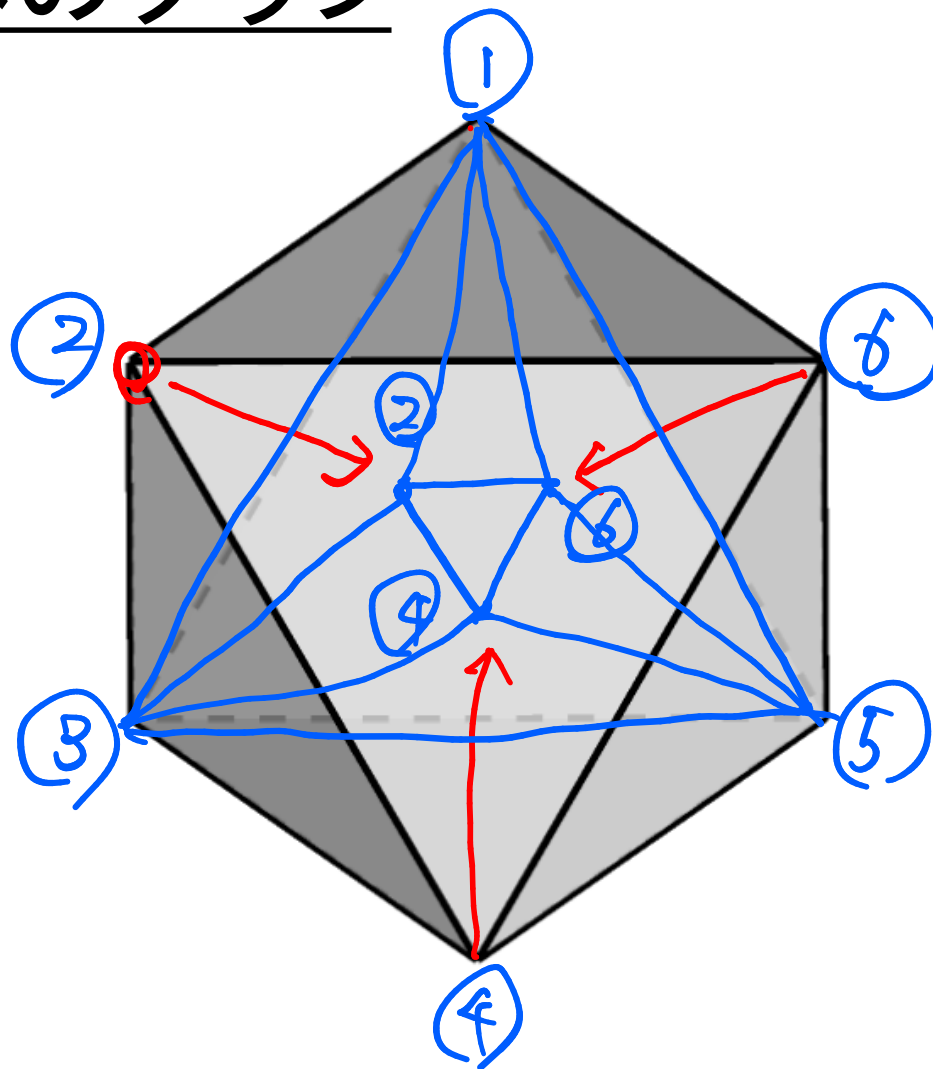
	1	2	3	4
1		0	0	0
2	0		0	0
3	0	0		0
4	0	0	0	



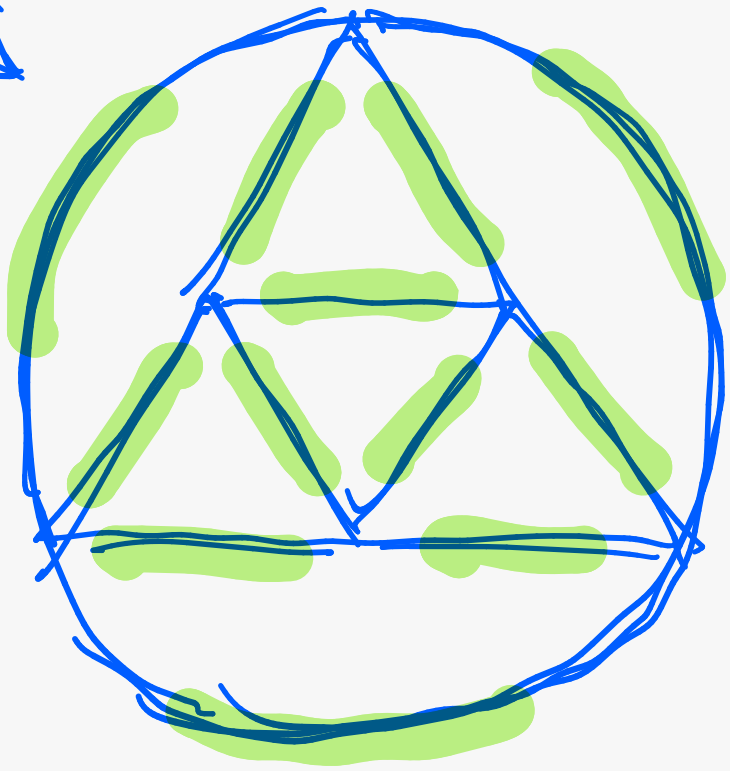
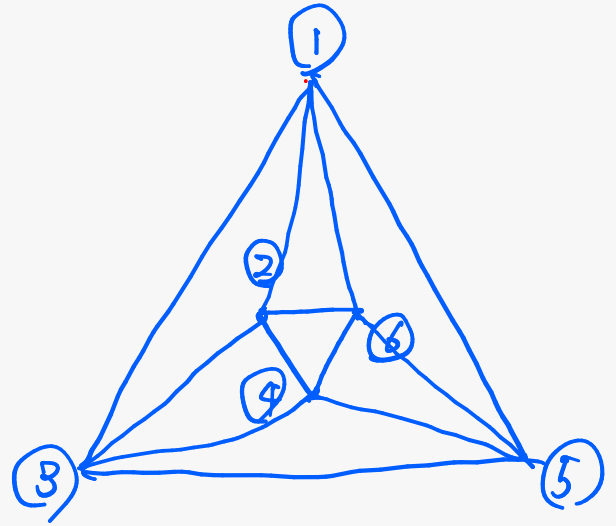
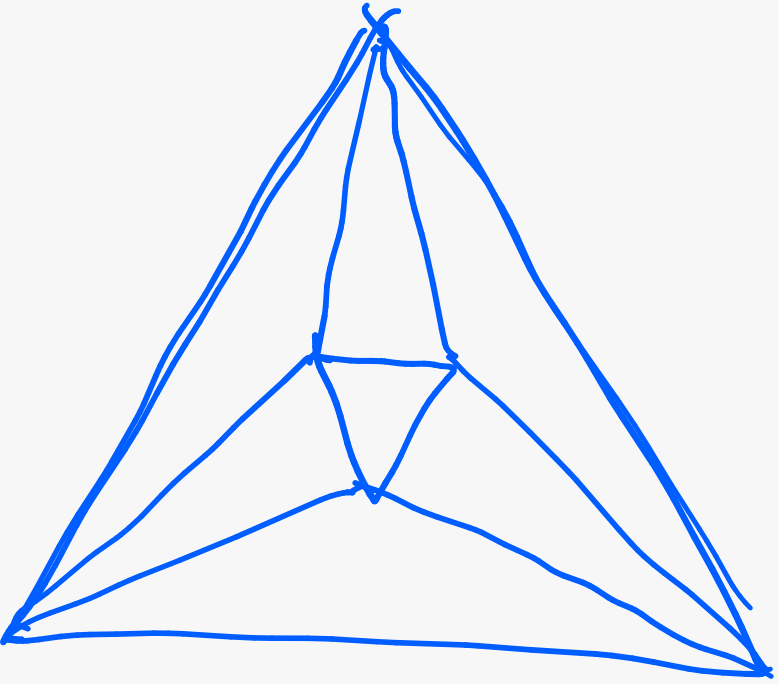
# 正六面体のグラフ



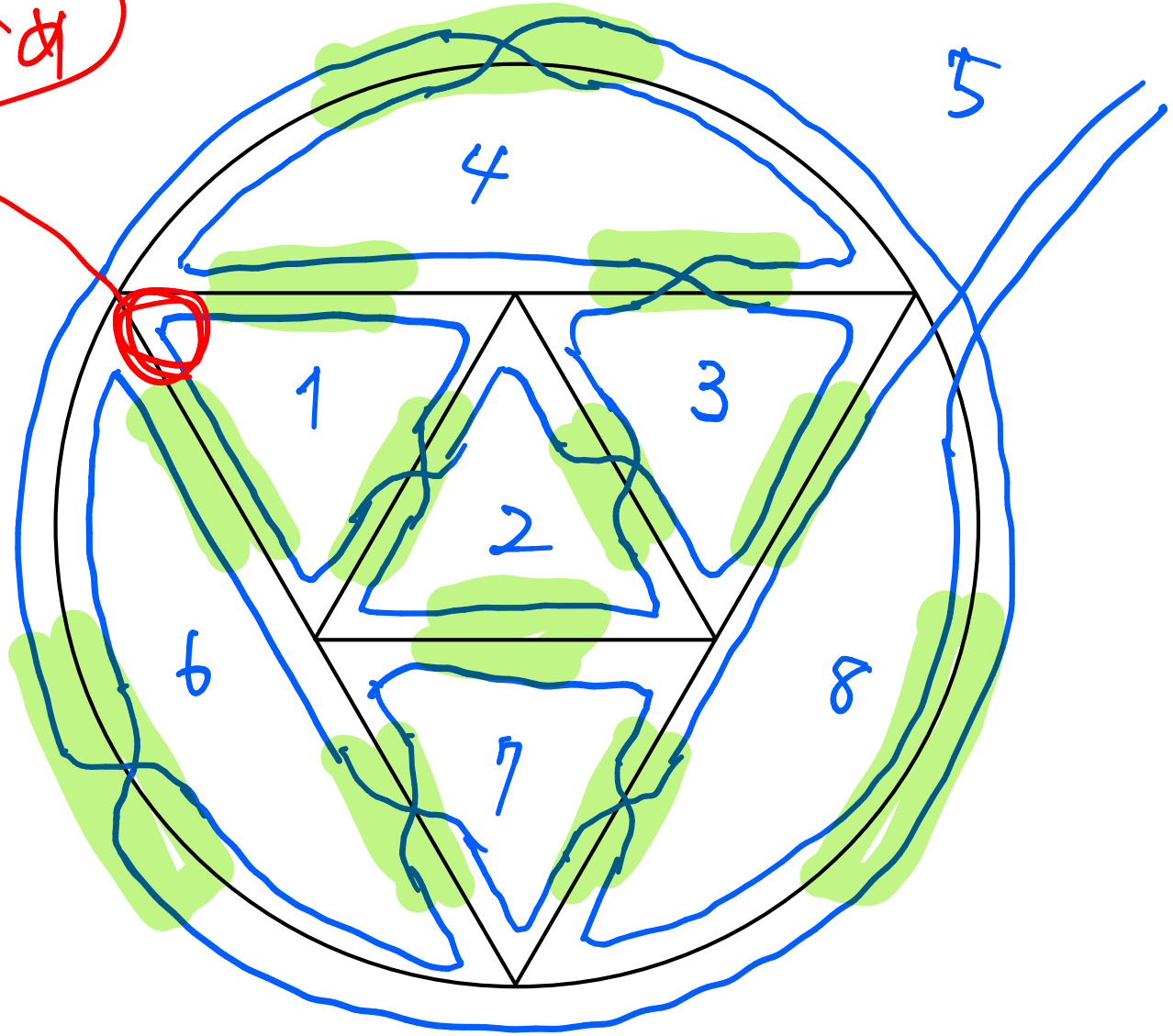
# 正八面体のグラフ



正八面体のグラフを描いてみよう

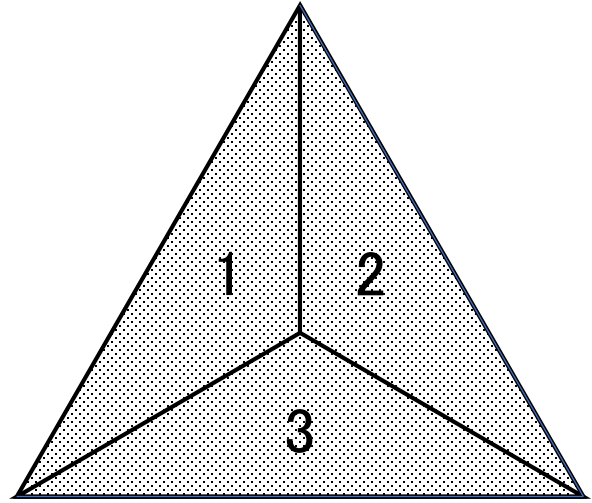
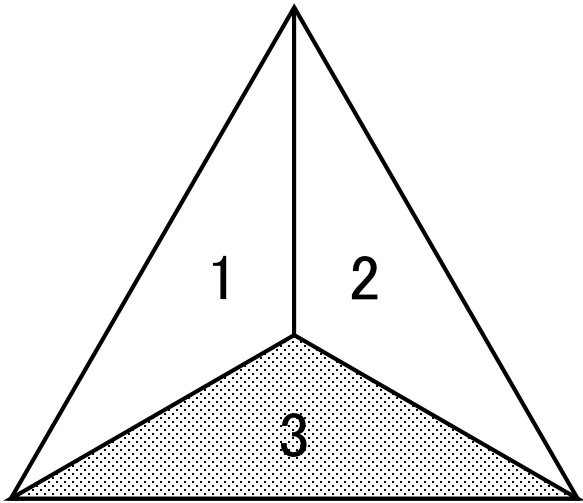
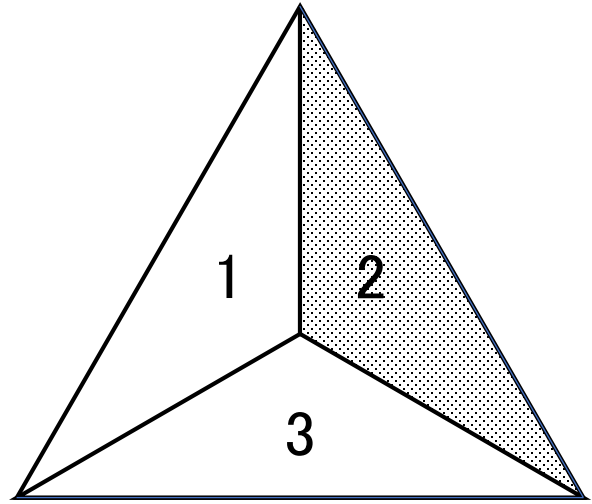
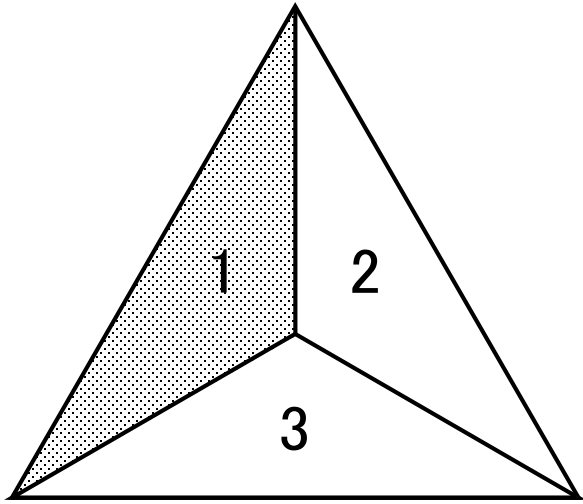


編み始め

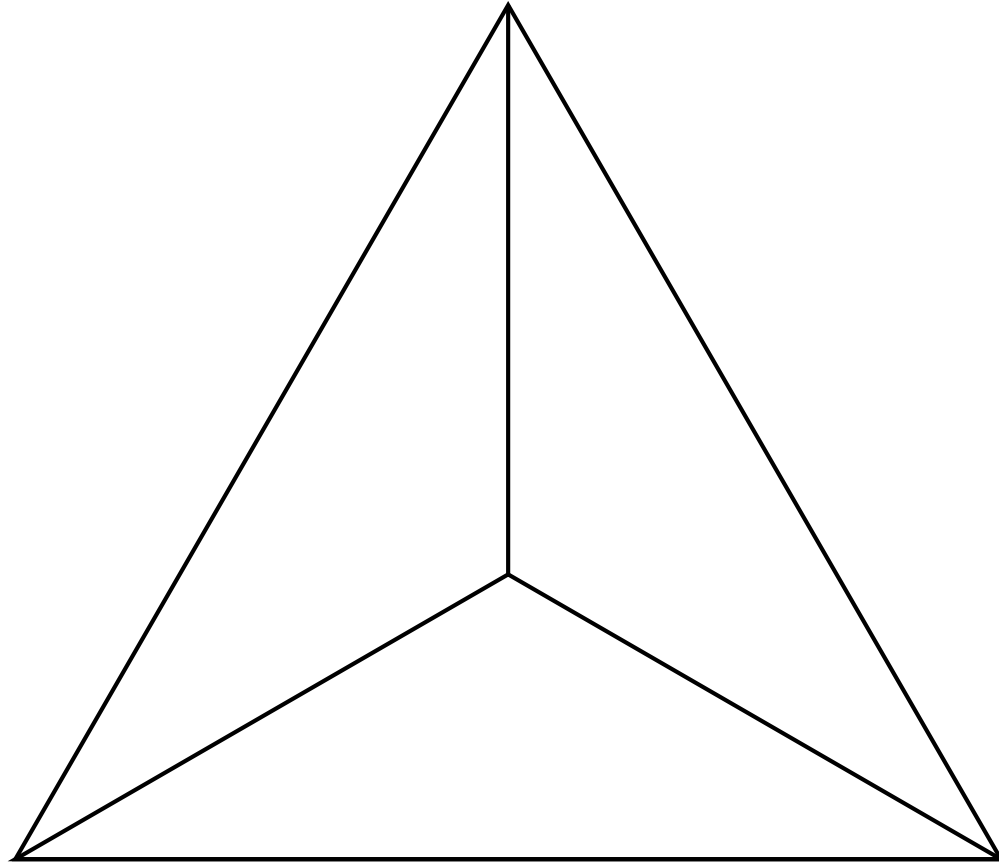




# 4. 正四面体を編む

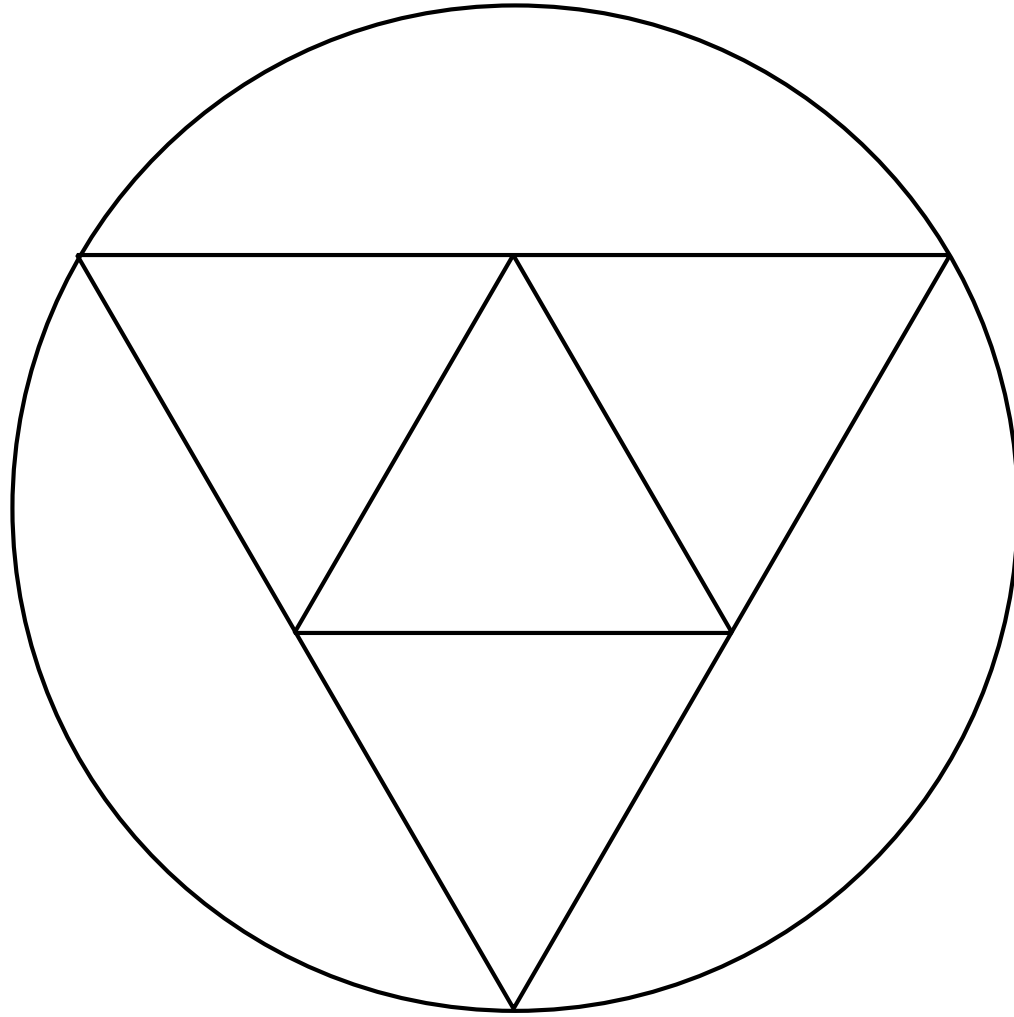


# 正四面体をストローで編む



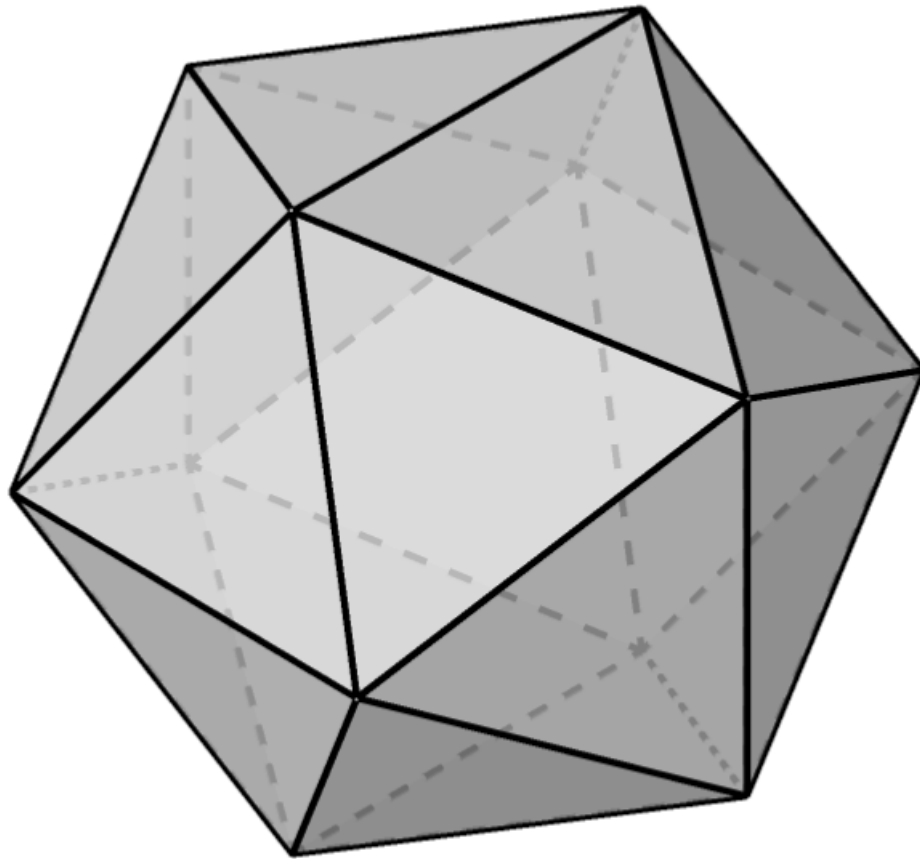
# 5. 正八面体を編む

# 正八面体のグラフ

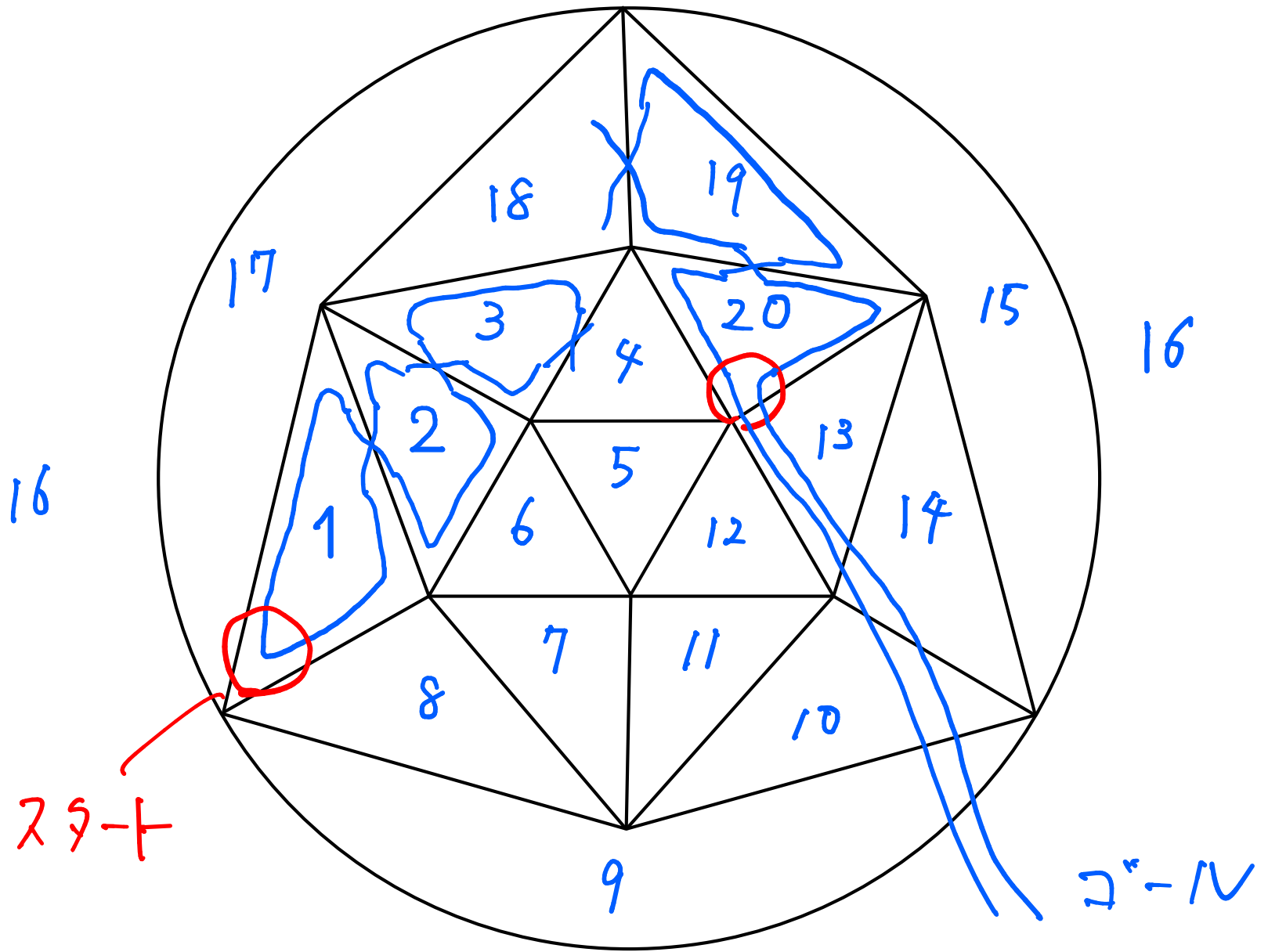


# 6. 正二十面体を編む

# 正二十面体のグラフ

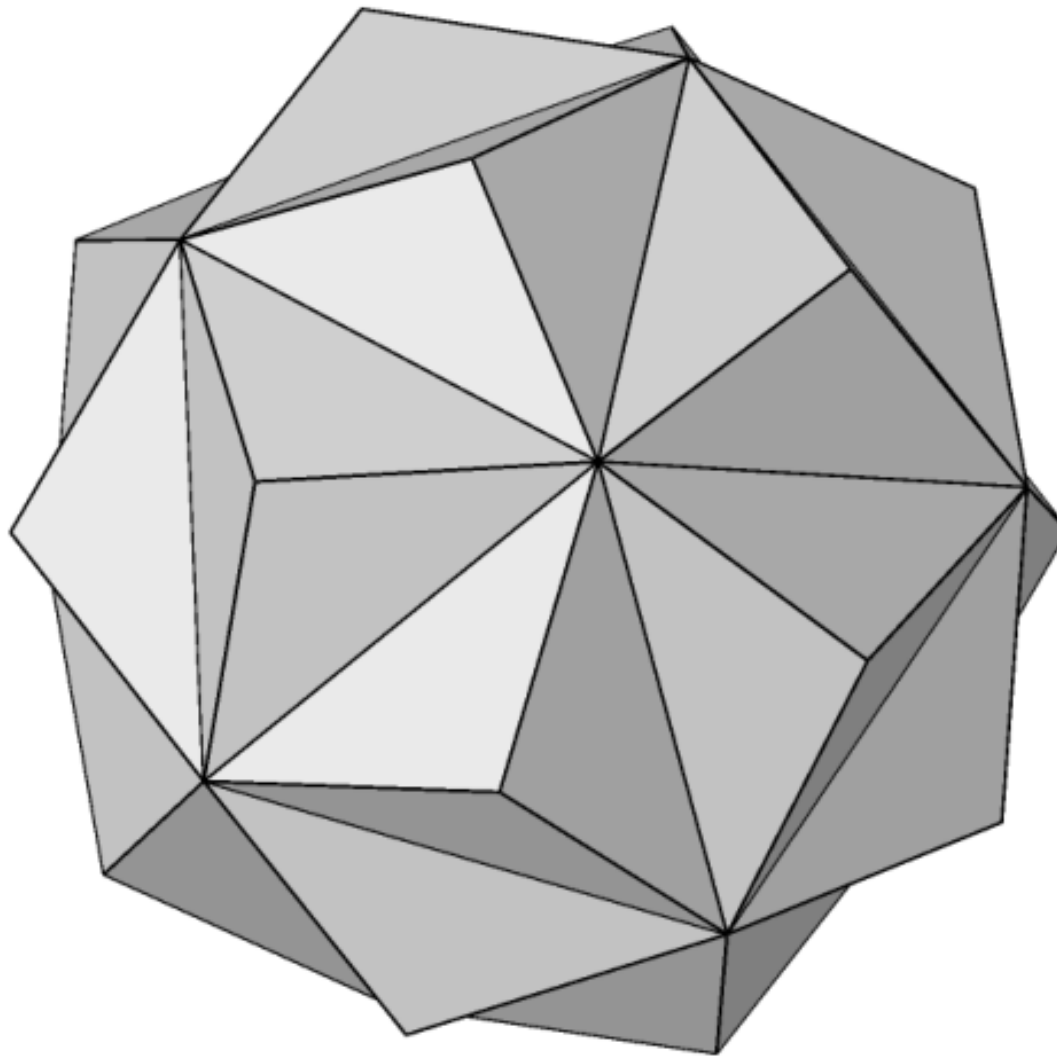


**正二十面体のグラフを描いてみよう**





# **7. 星形正二十面体を編む (おまけ)**



**星形二十面体のグラフは？**

