习题讲解

陈建文

习题

画出具有4个顶点的所有无向图（同构的只算一个）。

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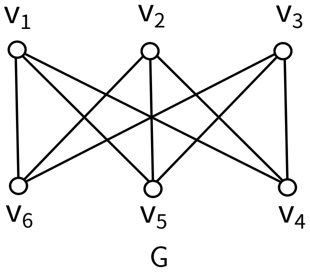
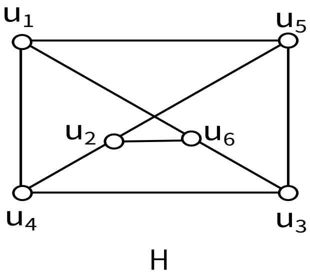
定义1

设$G=(V,E)$, $H=(U,F)$为两个图，如果存在一个一一对应$\phi:V\rightarrow U$，使得$\{u,v\}\in E$当且仅当$\{\phi(u),\phi(v)\}\in F$,则称G与H同构。





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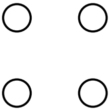

A

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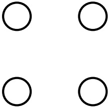
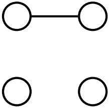


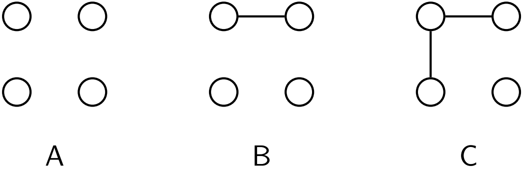
A



B

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



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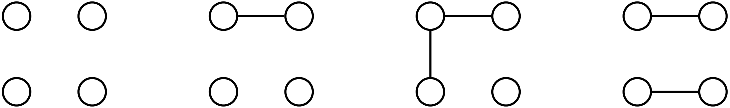

A　　B　　C　　D

习题

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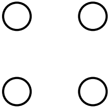
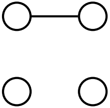


A



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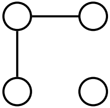
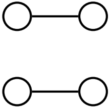
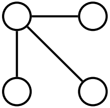


C



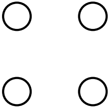
D



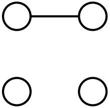
E

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



A



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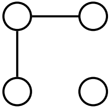

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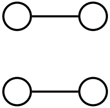

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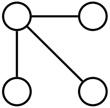

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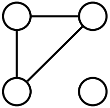

F

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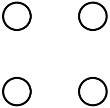
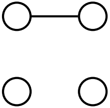
画出具有4个顶点的所有无向图（同构的只算一个）。



A



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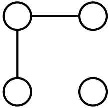
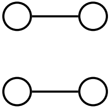


C



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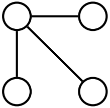

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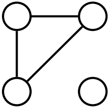

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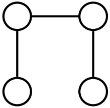

G

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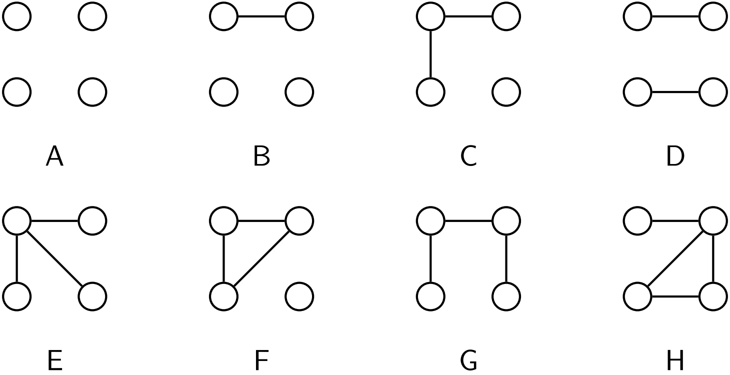
画出具有4个顶点的所有无向图（同构的只算一个）。



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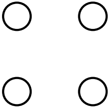
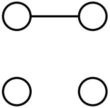
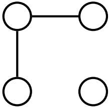


A



B



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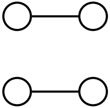
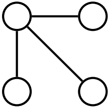


D



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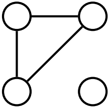

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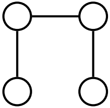
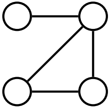
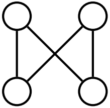


G



H



I

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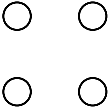
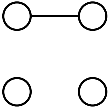


A



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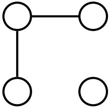

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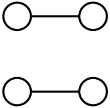
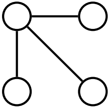
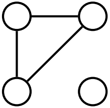


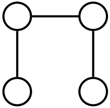
D



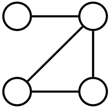
E



F



G



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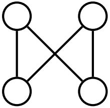

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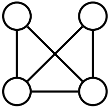

J

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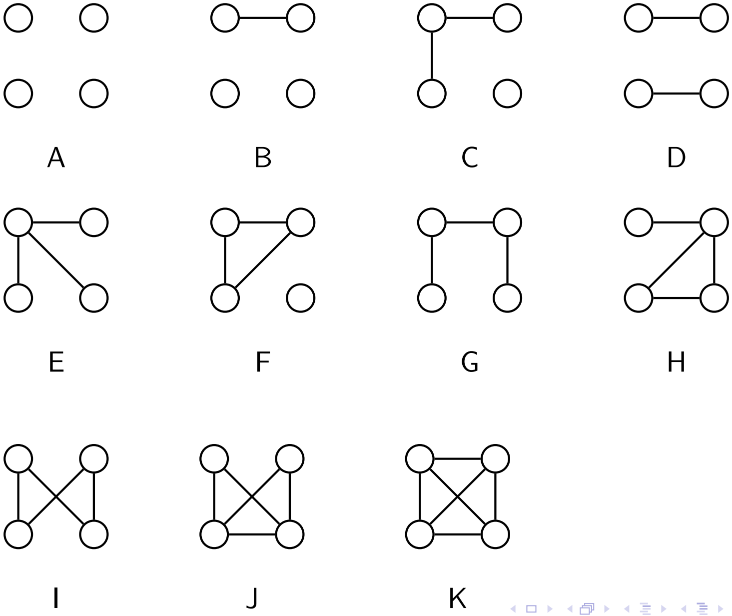
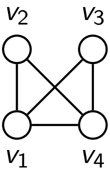




J

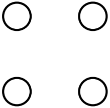
$$J = (V, E)$$
$$V = \{v_1, v_2, v_3, v_4\}$$
$$E = \{\{v_1, v_2\}, \{v_1, v_3\}, \{v_1, v_4\}, \{v_2, v_4\}, \{v_3, v_4\}\}$$

定义2

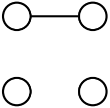
设$G=(V,E)$为一个图，图$G^c=(V,\mathcal{P}_2(V)\setminus E)$称为$G$的补图。如果$G$与$G^c$同构，则称$G$为自补图。

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



A



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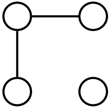

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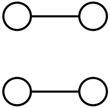

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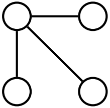
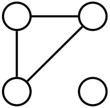


E



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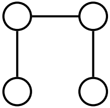
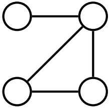


G



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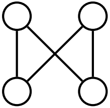

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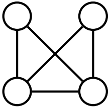

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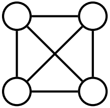
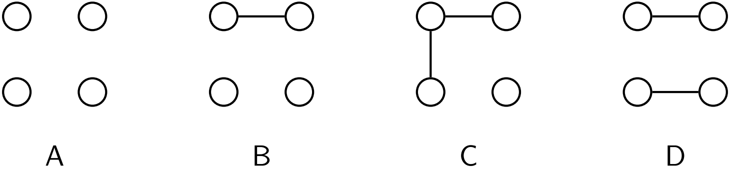


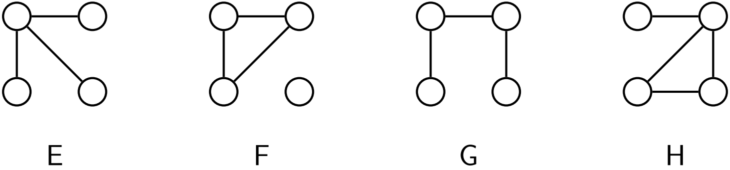
K

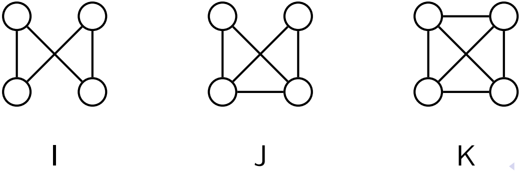
哪些图为自补图?

习题

画出具有4个顶点的所有无向图（同构的只算一个）。







哪些图为自补图？G

定义3

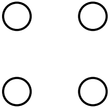
设$G = (V, E)$为一个图,如果G的顶点集V有一个二划分$\{V_1, V_2\}$，使得G的任一条边的两个端点一个在V_1中，另一个在V_2中，则称G为偶图。如果$\forall u \in V_1, v \in V_2$均有$uv \in E$，则称$G$为完全偶图，记为$K_{m,n}$，其中$|V_1| = m, |V_2| = n$。

定理1

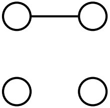
图G为偶图的充分必要条件为它的所有圈都是偶数长。

习题

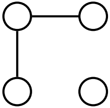
画出具有4个顶点的所有无向图（同构的只算一个）。



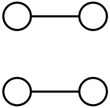
A



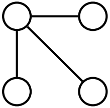
B



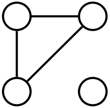
C



D



E



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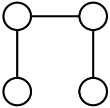

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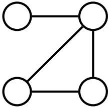

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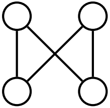

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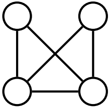

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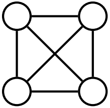
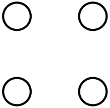


K

哪 些 图 为 偶 图?

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



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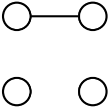

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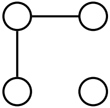

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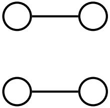

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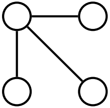

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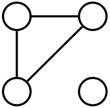

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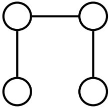

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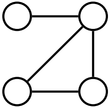

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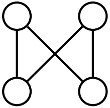

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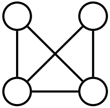

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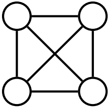
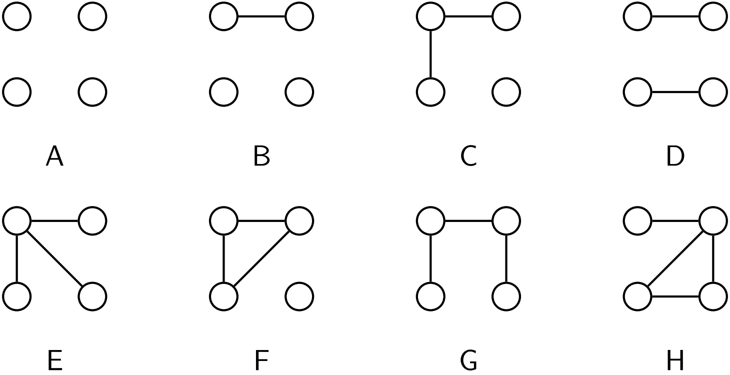


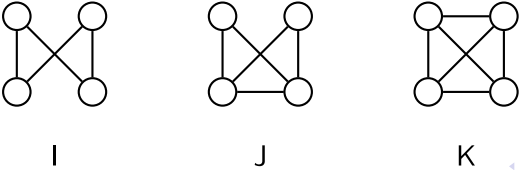
K

哪些图为偶图？ ABCDEGI

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



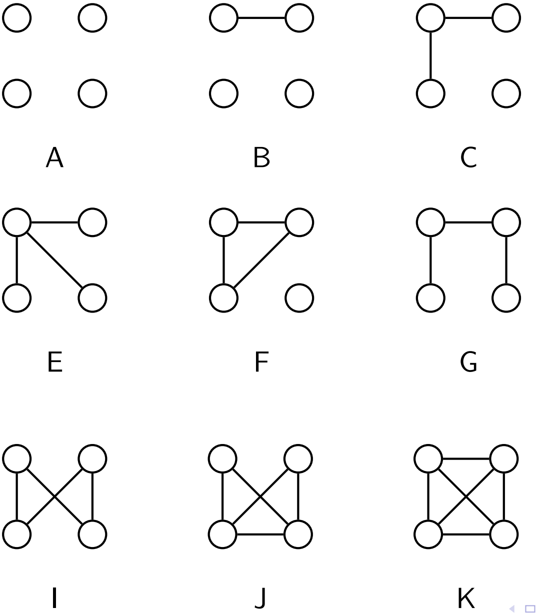


哪些图为偶图？ABCDEGI

哪些图为完全偶图？

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



哪些图为偶图? ABCDEGI

哪些图为完全偶图? EI

定义4

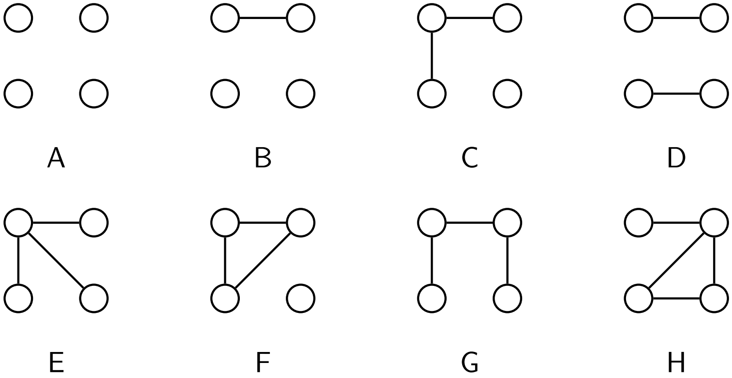
包含图的所有顶点和所有边的闭迹称为欧拉闭迹。存在一条欧拉闭迹的图称为欧拉图。

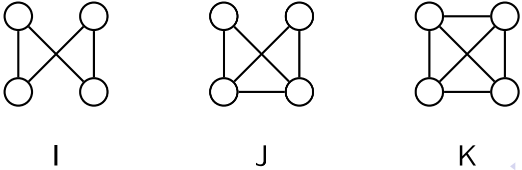
定理2

图G为欧拉图当且仅当G为连通的且每个顶点的度为偶数。

习题

画出具有4个顶点的所有无向图（同构的只算一个）。

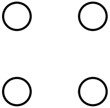




哪些图为欧拉图?

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



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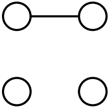

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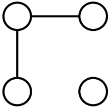

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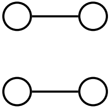
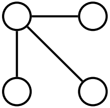


D



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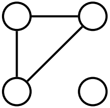

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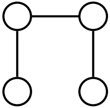
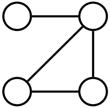


G



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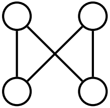
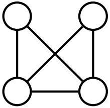


I



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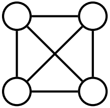


K

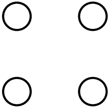
哪些图为欧拉图？ I

定义5

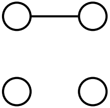
图G的一条包含所有顶点的路称为G的一条哈密顿路;图G的一个包含所有顶点的圈称为G的一个哈密顿圈。具有哈密顿圈的图称为哈密顿图。

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



A



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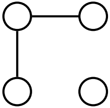

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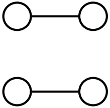

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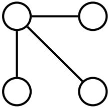
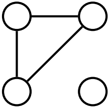


E



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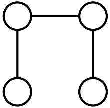

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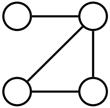

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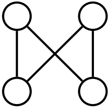

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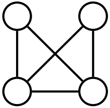

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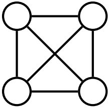
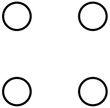


K

哪些图有哈密顿路？

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



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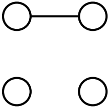

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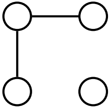

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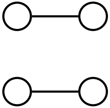

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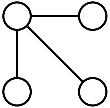

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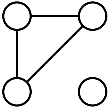

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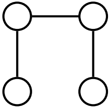

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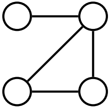

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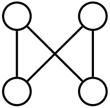

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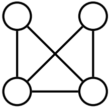

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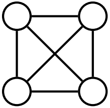

K

哪些图有哈密顿路？ GHIJK

习题

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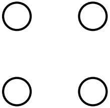

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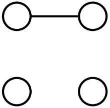

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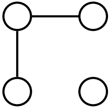

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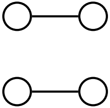

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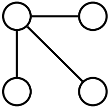

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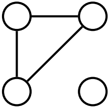

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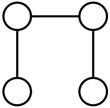

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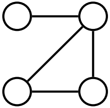

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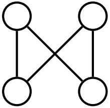

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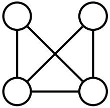

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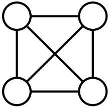


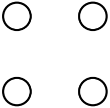
K

哪些图有哈密顿路？ GHIJK

哪些图为哈密顿图？

习题

画出具有4个顶点的所有无向图（同构的只算一个）。



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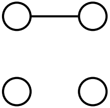
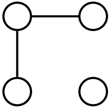


B



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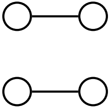

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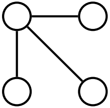

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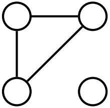

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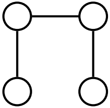

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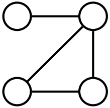

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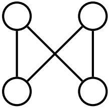

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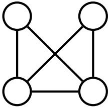

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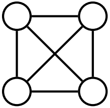

K

哪些图有哈密顿路？ GHIJK

哪些图为哈密顿图？ IJK

$$\frac{100!}{2^{40}*3600*24*365} > \frac{2^{100}}{2^{40}*2^{20}*2^{10}*2^{10}} = 2^{20}$$

$S = \{1, 2, 7, 14, 49, 98, 343, 686, 2409, 2793, 16808, 17206, 117705, 117993\}$
$t = 138457$
$S' = \{1, 2, 7, 98, 343, 686, 2409, 17206, 117705\}$

$a^3 + b^3 = c^3$