Matematika 3
Graph Theory

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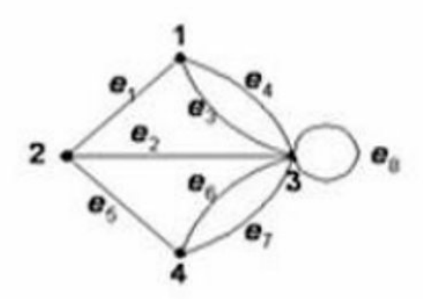
Contents

1 Question 1

a.) Tuliskan himpunan simpul / vertex (V) dan sisi / edge (E) dari graf di bawah ini!



- Himpunan simpul / vertex (V)

$$V = \{1, 2, 3, 4\}$$

- Himpunan sisi / edge (E)

$$E = \{e1, e2, e3, e4, e5, e6, e7, e8\}$$
$$E = \{(1,2), (2,3), (1,3), (1,3), (2,4), (3,4), (3,4), (3,3))\}$$

b.) Pada gambar tersebut, sebutkan simpul-simpul yang bertetangga dengan simpul 1, 2, 3, dan 4!

- **Simpul 1 :** 2, 3
- **Simpul 2 :** 1, 3, 4
- **Simpul 3 :** 1, 2, 4
- **Simpul 4 :** 2, 3

c.) Sebutkan sisi-sisi yang bersisian dengan simpul 1, 2, 3, dan 4!

- **Simpul 1 :** e1, e3, e4
- **Simpul 2 :** e1, e2, e5
- **Simpul 3 :** e2, e3, e4, e6, e7, e8
- **Simpul 4 :** e5, e6, e7

d.) Berapa derajat dari simpul 1, 2, 3, dan 4?

- **Simpul 1 :** 3
- **Simpul 2 :** 3

- **Simpul 3 :** 6
- **Simpul 4 :** 3

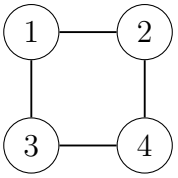
e.) Sebutkan 6 buah lintasan yang ada pada graf tersebut!

- **Lintasan 1 :** $1 \rightarrow e1 \rightarrow 2 \rightarrow e5 \rightarrow 4$
- **Lintasan 2 :** $1 \rightarrow e3 \rightarrow 3 \rightarrow e6 \rightarrow 4$
- **Lintasan 3 :** $1 \rightarrow e4 \rightarrow 3 \rightarrow e7 \rightarrow 4$
- **Lintasan 4 :** $2 \rightarrow e2 \rightarrow 3 \rightarrow e6 \rightarrow 4$
- **Lintasan 5 :** $2 \rightarrow e5 \rightarrow 4$

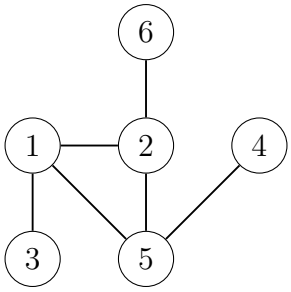
2 Question 2

Berilah contoh graf tidak kosong paling sederhana yang memenuhi kondisi berikut:

a.) Tidak memiliki simpul berderajat ganjil



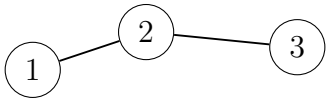
b.) Tidak memiliki titik berderajat genap



c.) Memiliki tepat 1 titik berderajat ganjil

It's not possible since it would violate the Handshaking Lemma.

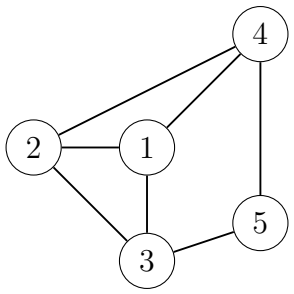
d.) Memiliki tepat 2 titik berderajat ganjil



3 Question 3

Tentukan apakah ada graf sederhana dengan 5 titik yang masing-masing berderajat berikut ini. Jika ada, gambarkan graf tersebut!

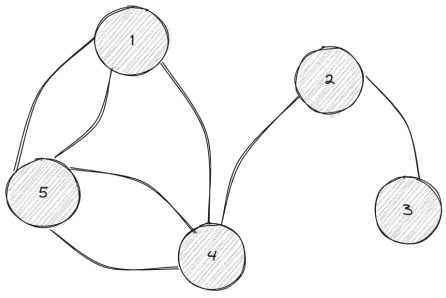
a.) 3, 3, 3, 2, 3



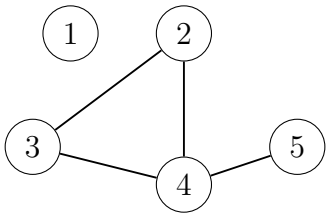
b.) 1, 2, 4, 3, 5

This is not possible since it would violate the Handshaking Lemma. The odd degree must be even, in this case there are 3 of them which are 1, 3, and 5.

c.) 1, 2, 3, 4, 4



d.) 0, 1, 2, 2, 3



4 Question 4

Carilah 3 contoh penerapan graph dalam kehidupan sehari-hari

1. Graph in Social Media connection. It's being used to determine the connection between users in social media. It's also being used to determine the connection between users and the content they like. This can be used to determine the content that the user might like or users they might know.

2. Graph in Google Maps. It's being used to determine the distance between two places. It's also being used to determine the shortest path between two places. More specifically the one being used is usually a weighted graph.

3. Graph in Computer Network Topology. It's being used to determine the connection between computers. It's also being used to determine the nearest computer to a computer. This can be used to determine the shortest path between two computers which can determine the fastest way to send data between two computers.