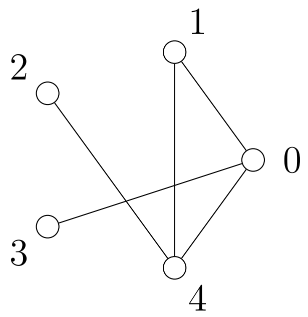
姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 3 & -1 & 0 & -1 & -1 \\ -1 & 2 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 & -1 \\ -1 & 0 & 0 & 1 & 0 \\ -1 & -1 & -1 & 0 & 3 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{3}$.

Check code = (number of spanning trees) mod 10 = 3.

NumSpanTree 1

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

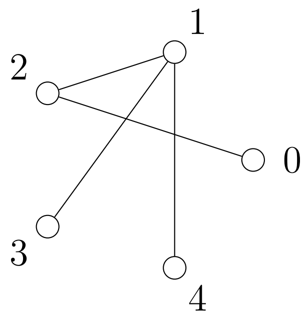
check code

3

姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 1 & 0 & -1 & 0 & 0 \\ 0 & 3 & -1 & -1 & -1 \\ -1 & -1 & 2 & 0 & 0 \\ 0 & -1 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 & 1 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{1}$.

Check code = (number of spanning trees) mod 10 = 1.

NumSpanTree 2

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

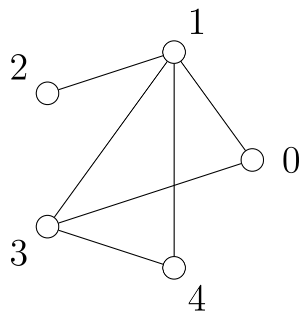
check code

1

姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 2 & -1 & 0 & -1 & 0 \\ -1 & 4 & -1 & -1 & -1 \\ 0 & -1 & 1 & 0 & 0 \\ -1 & -1 & 0 & 3 & -1 \\ 0 & -1 & 0 & -1 & 2 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{8}$.

Check code = (number of spanning trees) mod 10 = 8.

NumSpanTree 3

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

8

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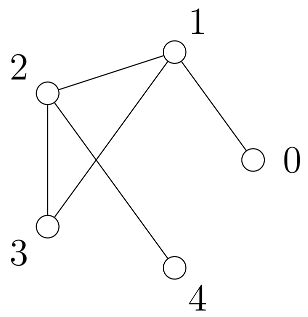
Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 1 & -1 & 0 & 0 & 0 \\ -1 & 3 & -1 & -1 & 0 \\ 0 & -1 & 3 & -1 & -1 \\ 0 & -1 & -1 & 2 & 0 \\ 0 & 0 & -1 & 0 & 1 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{3}$.

Check code = (number of spanning trees) mod 10 = 3.

NumSpanTree 4

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

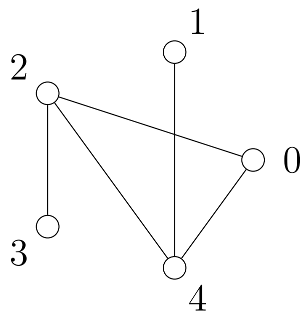
check code

3

姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 2 & 0 & -1 & 0 & -1 \\ 0 & 1 & 0 & 0 & -1 \\ -1 & 0 & 3 & -1 & -1 \\ 0 & 0 & -1 & 1 & 0 \\ -1 & -1 & -1 & 0 & 3 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{3}$.

Check code = (number of spanning trees) mod 10 = 3.

NumSpanTree 5

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

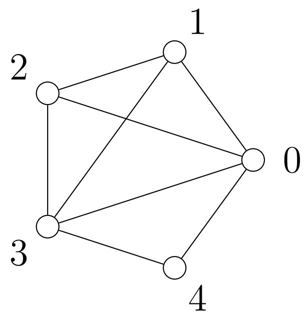
check code

3

姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 4 & -1 & -1 & -1 & -1 \\ -1 & 3 & -1 & -1 & 0 \\ -1 & -1 & 3 & -1 & 0 \\ -1 & -1 & -1 & 4 & -1 \\ -1 & 0 & 0 & -1 & 2 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{40}$.

Check code = (number of spanning trees) mod 10 = 0.

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

0

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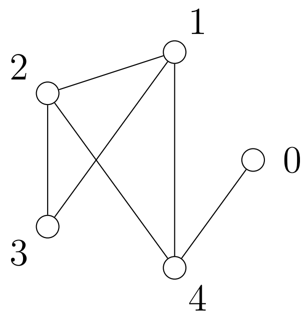
Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 1 & 0 & 0 & 0 & -1 \\ 0 & 3 & -1 & -1 & -1 \\ 0 & -1 & 3 & -1 & -1 \\ 0 & -1 & -1 & 2 & 0 \\ -1 & -1 & -1 & 0 & 3 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{8}$.

Check code = (number of spanning trees) mod 10 = 8.

NumSpanTree 7

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

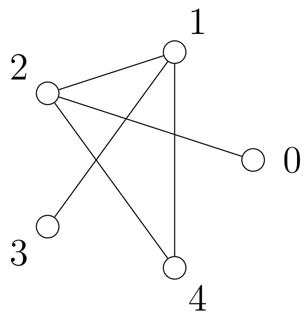
check code

8

姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 1 & 0 & -1 & 0 & 0 \\ 0 & 3 & -1 & -1 & -1 \\ -1 & -1 & 3 & 0 & -1 \\ 0 & -1 & 0 & 1 & 0 \\ 0 & -1 & -1 & 0 & 2 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{3}$.

Check code = (number of spanning trees) mod 10 = 3.

NumSpanTree 8

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

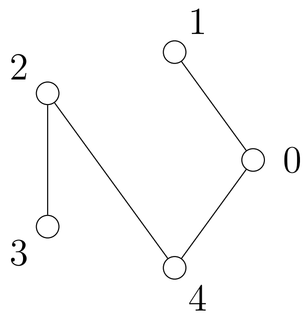
check code

3

姓名 Name : ____________________ 學號 Student ID # : ____________________

Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 2 & -1 & 0 & 0 & -1 \\ -1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 2 & -1 & -1 \\ 0 & 0 & -1 & 1 & 0 \\ -1 & 0 & -1 & 0 & 2 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{1}$.

Check code = (number of spanning trees) mod 10 = 1.

NumSpanTree 9

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

1

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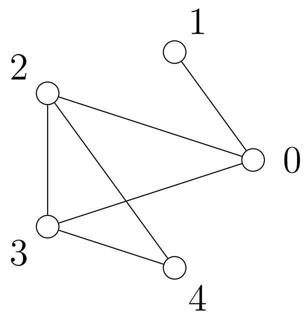
Quiz 3 MATH 207: Discrete Mathematics II

Let G be the graph on 5 vertices as shown below.



Count the number of spanning trees of G.

Check code = (number of spanning trees) mod 10

Solution.

The Laplacian matrix of G is

$$L = \begin{bmatrix} 3 & -1 & -1 & -1 & 0 \\ -1 & 1 & 0 & 0 & 0 \\ -1 & 0 & 3 & -1 & -1 \\ -1 & 0 & -1 & 3 & -1 \\ 0 & 0 & -1 & -1 & 2 \end{bmatrix}.$$

Let L' be the matrix obtained from L by removing the first row and the first column. Then the number of spanning trees is $|\det(L')| = \boxed{8}$.

Check code = (number of spanning trees) mod 10 = 8.

NumSpanTree 10

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

8