Name:       School:

Date:       Facilitator:

6.05 Graph Properties (54 Points)

# ****Hamiltonian and Hamilton Path (12 points)****

1. **In the Hamiltonian graph of *G*1, *G*2, and *G*3, identify a circuit.**

**Then, identify an edge that can be removed to make the Hamiltonian graph a Hamilton path.**

| A diagram of a triangle with red dots and black lines  Description automatically generated | A diagram of a network  Description automatically generated | A diagram of a network  Description automatically generated |
| --- | --- | --- |

Fill in the table below.

| **Graphs** | **Identify a circuit.** | **Identify an edge that can be removed to become a Hamilton path.** |
| --- | --- | --- |
| *G*1 |       |       |
| *G*2 |       |       |
| *G*3 |       |       |

# ****Bipartite Graphs and Hamiltonian (10 points)****

1. Does the bipartite graph of *G*4 has a Hamilton path or is it Hamiltonian?

Explain why it is a Hamilton path or Hamiltonian.



| *Write your response below:* |
| --- |
|  |

1. Does the bipartite graph of *G*5 has a Hamilton path or is it Hamiltonian?

Explain why it is a Hamilton path or Hamiltonian.



| *Write your response below:* |
| --- |
|  |

# ****Hamilton Path, Circuit and Connected Graphs (12 points)****

1. **Look at each graph below.**

**Which connected paths below have a Hamilton path or circuit?**

**Find the path or circuit for each graph.**

| A diagram of a diagram of a square  Description automatically generated | A diagram of a diagram of a line  Description automatically generated | A diagram of a diagram of a diagram  Description automatically generated |
| --- | --- | --- |

Fill in the table below.

| **Graphs** | **Hamilton path, Hamilton circuit, or neither?** | **List the path or circuit** |
| --- | --- | --- |
| *G*6 |       |       |
| *G*7 |       |       |
| *G*8 |       |       |

# ****Tree Graphs (10 points)****

1. Let $T\_{1}=\left(v\_{1},e\_{1}\right)$ and $T\_{2}=\left(v\_{2},e\_{2}\right)$ be two trees with $e\_{1}=11$ and $v\_{2}=4v\_{1}$.

Find:

* $v\_{1}, $
* $v\_{2}, $and
* $e\_{2}$.

Remember: $e=v-1$.

Show your work in the space provided below.

| **Show your work here:** |
| --- |
|  |

1. Let $T\_{1}=\left(v\_{1},e\_{1}\right)$ and $T\_{2}=\left(v\_{2},e\_{2}\right)$ be two trees with $e\_{1}=12 $and $v\_{2}=3+5v\_{1}$.

Find:

* $v\_{1}, $
* $v\_{2}, $and
* $e\_{2}$.

Remember: $e=v-1$.

Show your work in the space provided below.

| **Show your work here:** |
| --- |
|  |

# ****Tree or not a Tree (10 points)****

1. Describe each graph below. Explain how many vertices and how many edges it has, and if it is a tree or not a tree.

|  |  |  |
| --- | --- | --- |

| *Write your response below:* |
| --- |
|  |

1. Describe each graph below. Explain how many vertices and how many edges it has, and if it is a tree or not a tree.

|  |  |  |
| --- | --- | --- |

| *Write your response below:* |
| --- |
|  |