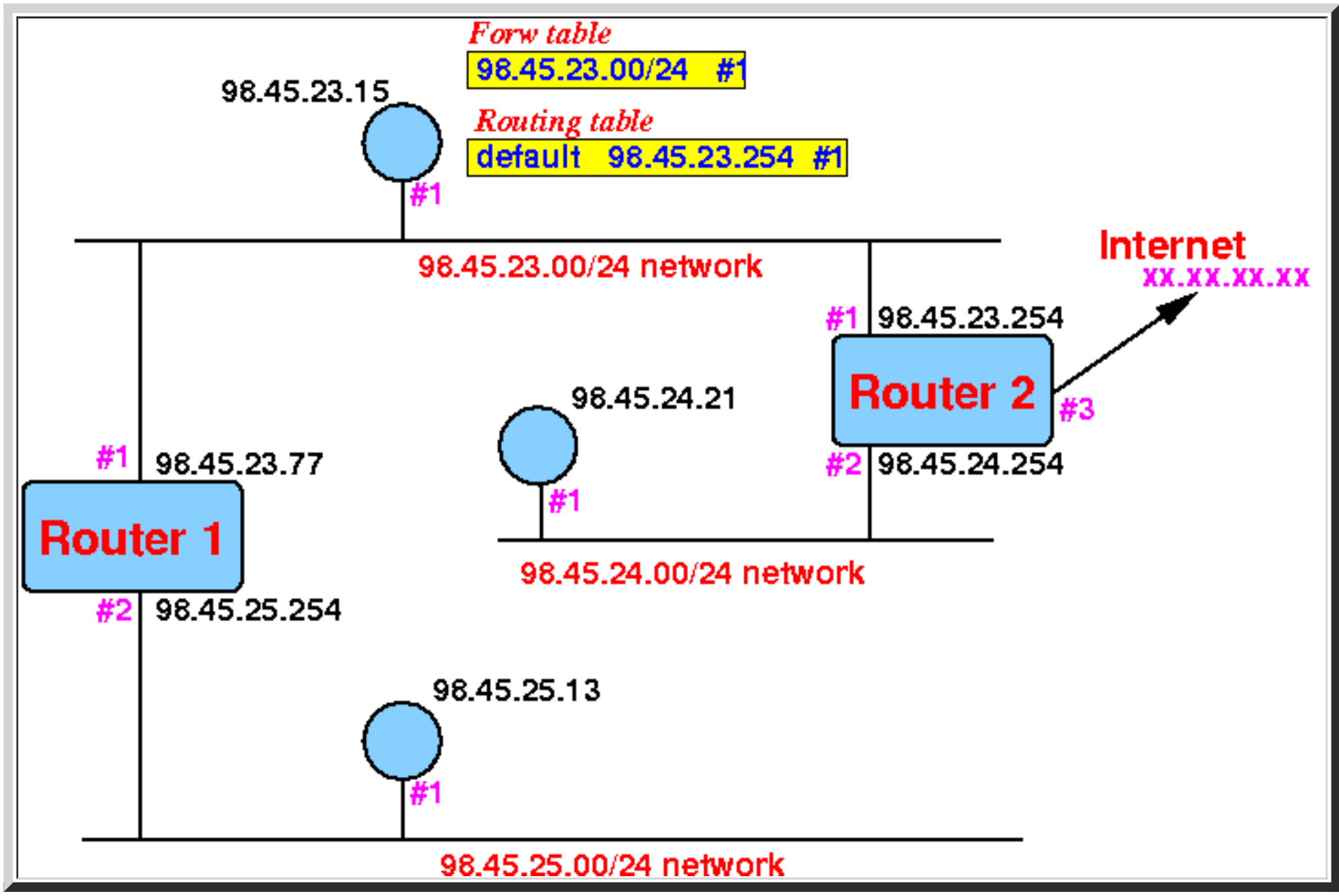
# CS455, Homework 8

- **Question 1 (30 pts)**
  - Consider the following network topology:




**Questions:**

- Give the **IP forwarding table** of the **router 1** (5 pts)

- Give the **IP routing table** of the **router 1** (5 pts)

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- Give the **IP forwarding table** of the **router 2** (5 pts)

- Give the **IP routing table** of the **router 2** (5 pts)

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- Suppose the node `98.45.23.15` sends an **IP packet** to the node `98.45.25.13`

  - Which **node** is the ***next* node** that will receive the message from `98.45.23.15` ? (5 pts)

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  - When the **node** in the **previous question** receives the **IP packet**, what **ICMP message** will it send to `98.45.23.15` ? (5 pts)

    (Give the **content** of this **ICMP message**)

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- **Question 2 (30 pts)**

  - For this question, you may need to **login** to certain computers in the **MathCS lab** using the command:

    ```
    ssh -X machineName
    ```

  - Find out the following **information** of some of the **computers** in the **MathCS department**:

    - The **Ethernet address** of the computer **lab1a.mathcs.emory.edu**

      Show the command(s) that you used (5 pts)

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    - The **IP address** of the computer **lab1a.mathcs.emory.edu**

Show the command(s) that you used (5 pts)

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- The **IP forwarding table** of the computer **lab1a.mathcs.emory.edu**

Show the command(s) that you used (5 pts)

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- The **IP routing table** of the computer **lab1a.mathcs.emory.edu**

Show the command(s) that you used (5 pts)

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- The **Ethernet address** of the computer **170.140.150.1**

Show the command(s) that you used (10 pts)

- You **cannot** login to this **computer**.

  Try to figure out a way to get its Ethernet address....

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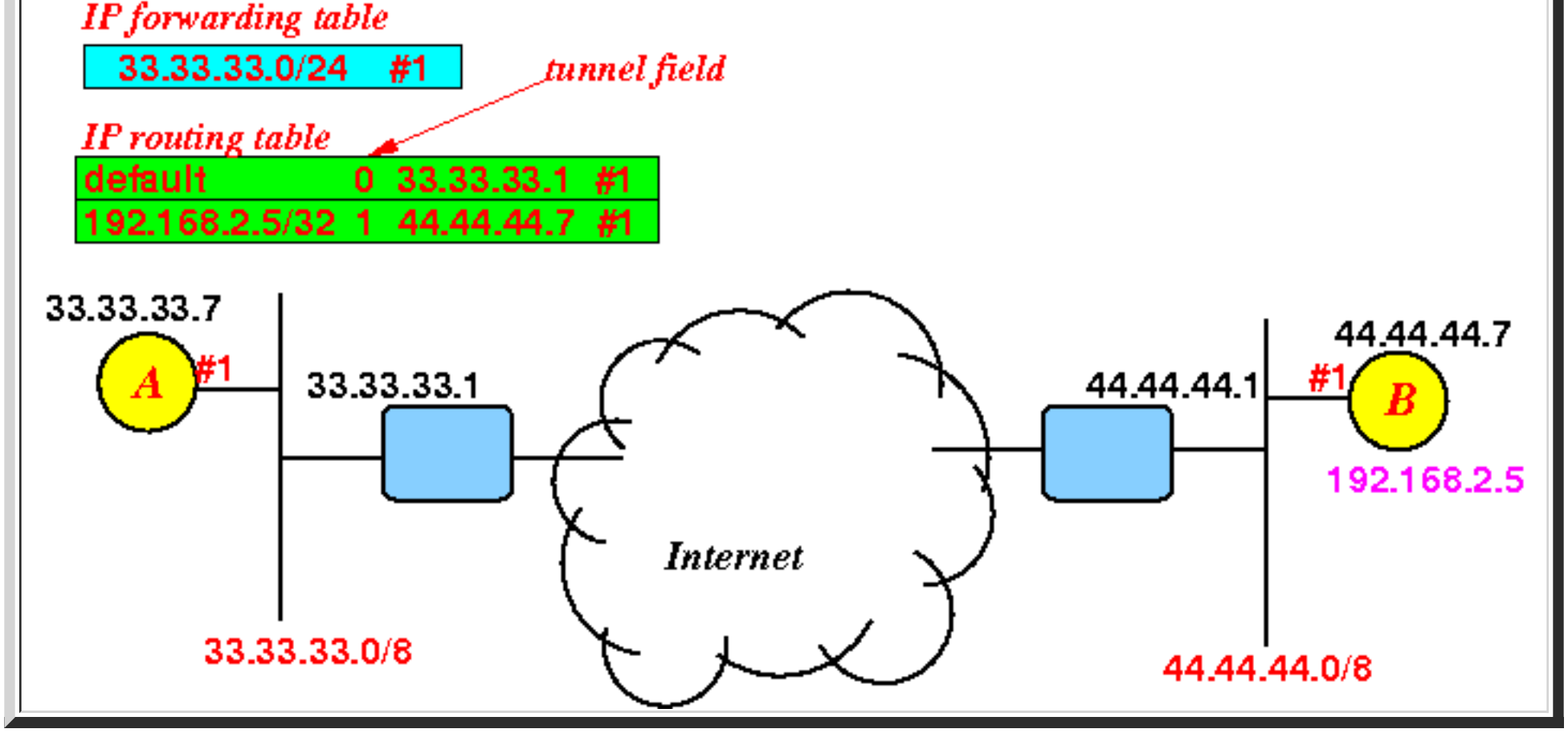
- **Quesion 3 (40 pts)**
  - Consider the following 2 IP networks:




**Information:**

- The **left** IP network has **network ID** `33.33.33.0/8`
- The **right** IP network has **network ID** `44.44.44.0/8`

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- The **host *A*** on the ***left* IP network** has the **IP address** `33.33.33.7`

  - It's **IP forwarding and routing tables** are given in the **figure above**

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- The **host *B*** on the ***right* IP network** has **2 IP addresses**

  - The **IP address** `44.44.44.7` is its **"normal" IP address** for its **home network**
  - The **IP address** `192.168.2.5` is created for some other network operation --- what purpose is irrelevant to the question

    (You should not be completely shocked that a host can have 2 IP addresses because as you know, a **router** can have ***multiple* IP addresses**

In this question, an **IP packet** is represented as follows:

*Representation of an IP packet:*

| src IP addr |
|---|
| dst IP addr |
| data |

*Example:*

| 33.33.33.7 |
|---|
| 33.33.33.1 |
| Hello |

Initially, the **ARP cache** of node ***A*** is **empty**.

If you need to use **encapsulation** in your answer, simply put the **entire IP packet** in the **data portion** of a **new IP packet**.

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**Questions:**

- The host ***A*** sends an **IP packet** with **data = `Hello`** to the host ***B*** using the IP address **`44.44.44.7`**.
  - Show the **IP packet** (in the **specified representation** given above) that host ***A*** will send. (10 pts)
  - What is the **ARP request** that the host ***A*** will broadcast in order to send the **IP packet** ? (10 pts)

Answer the questions again, but now:

- The host ***A*** sends an **IP packet** with **data = `Hello`** to the host ***B*** using the IP address **`192.168.2.5`**.
  - Show the **IP packet** (in the **specified representation** given above) that host ***A*** will send. (10 pts)
  - What is the **IP address** of the ***next*** **node** will receive (and route) this **IP packet** ? (10 pts)