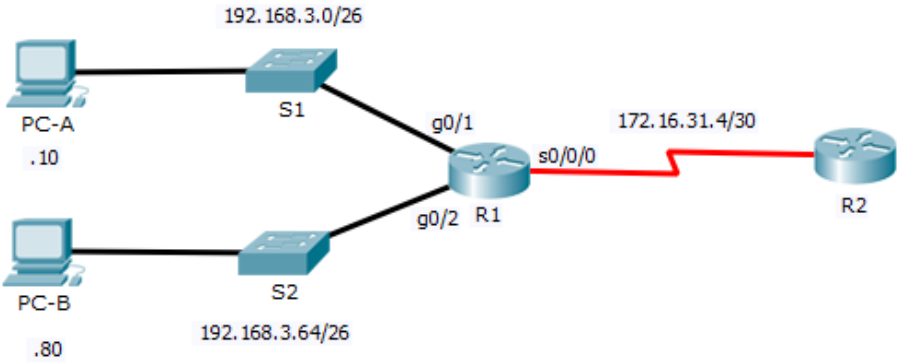
Part 1: Answer the following M/C questions.

1. Which of the following is a wildcard of the subnet mask 255.255.255.240?
   a. 0.0.0.3
   b. 0.0.0.15
   c. 0.0.0.14
   d. 0.0.0.255
2. When configuring a Standard ACL rule, you are limited only to:
   a. Destination Address.
   b. Interface Direction.
   c. Source Address.
   d. Port Numbers.
3. This type of NAT is considered as one to one mapping of private IP address to public IP address:
   a. Static NAT.
   b. PAT.
   c. NAT Overload.
   d. Dynamic NAT.
4. What is the maximum network diameter permitted by the default metric of RIPv2?

   a. 15 hops
   b. 16 hops
   c. 100 hops
   d. 120 hops
   e. 255 hops

5. Based on the network shown below, only PC-A is not allowed to communicate outside its network.



Which configuration of the followings is correct?

a. R1(Config) # access-list 25 deny host 192.168.3.10
R1(Config) # interface s0/0/0
R1(Config-if) # ip access-group 25 out

b. R1(Config) # access-list 25 deny host 192.168.3.10

R1(Config) # interface g0/1
R1(Config-if) # ip access-group 25 in

c. R1(Config) # access-list 25 deny 192.168.3.0 0.0.0.64
R1(Config) # interface s0/0/0
R1(Config-if) # ip access-group 25 out

d. R1(Config) # access-list 25 deny 192.168.3.0 0.0.0.64
R1(Config) # interface g0/1
R1(Config-if) # ip access-group 25 in

6. Which command would you configure on the router's interface that is connected to the Internet?
   a. ip outside global
   b. ip inside global
   c. ip nat inside
   d. ip nat outside **
7. Which command will create a dynamic pool named *Todd* that will provide you with 30 global addresses?
   a. ip nat pool Todd 171.16.10.65 171.16.10.94 net 255.255.255.240
   b. ip nat pool Todd 171.16.10.65 171.16.10.94 net 255.255.255.224 ****
   c. ip nat pool todd 171.16.10.65 171.16.10.94 net 255.255.255.224
   d. ip nat pool Todd 171.16.10.1 171.16.10.254 net 255.255.255.0

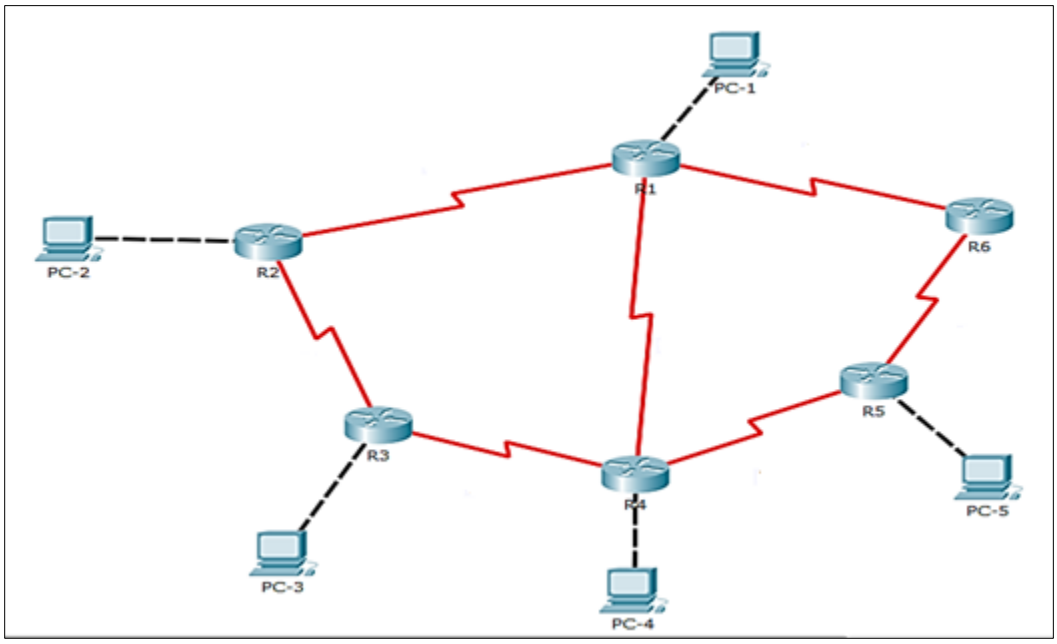
8. Which command will show you the summary of the NAT configuration?
   a. show ip nat translations
   b. show ip nat statistics ****
   c. debug ip nat
   d. clear ip nat translations

9. In a router on the stick scenario, the link between the router and the switch should be:
   a. Access in only one VLAN
   b. Trunk that carries traffic for all VLANs
   c. Dynamic auto that carries some of the VLANs
   d. Dynamic desirable in only one VLAN

Part 2: Configuration and network analysis: RIP dynamic protocol

Refer to the following topology.

Q1) PC5 wants to calculate the shortest path to all the remote networks (shown as PCs). Fill the table with the minimum cost to reach each network with RIP protocol, and its corresponding paths taking into consideration that the metric (i.e., cost) of RIP is the hop count.



PC-5 wants to connect to all of the following PCs:		
PC Name	Minimal Cost	Best Path (list the name of the routers)
PC-1	3	R5 R6 • R1 • PC-1
PC-2	4	R5 R6 • R1 • R2 • PC-2 **Or** R5 R4 • R3 • R2 • PC-2
PC-3	3	R5 • R4 • R3 • PC-3
PC-4	2	R5 • R4 • PC-4

Q2) Compare Link-state **against** distance vector routing protocols by filling the below table with **Yes** or **No**:

Feature	**Distance vector [Yes/No]**	**Link-state [Yes/No]**
1. Creates Full network topology	NO	YES
2. Directly connected routes are advertised	YES	YES

3. Best routes are chosen best on the lowest metric	YES	YES
4. Characterized by High bandwidth consumption	YES	NO
5. Characterized by High router resources (Memory/CPU) consumption	NO	YES

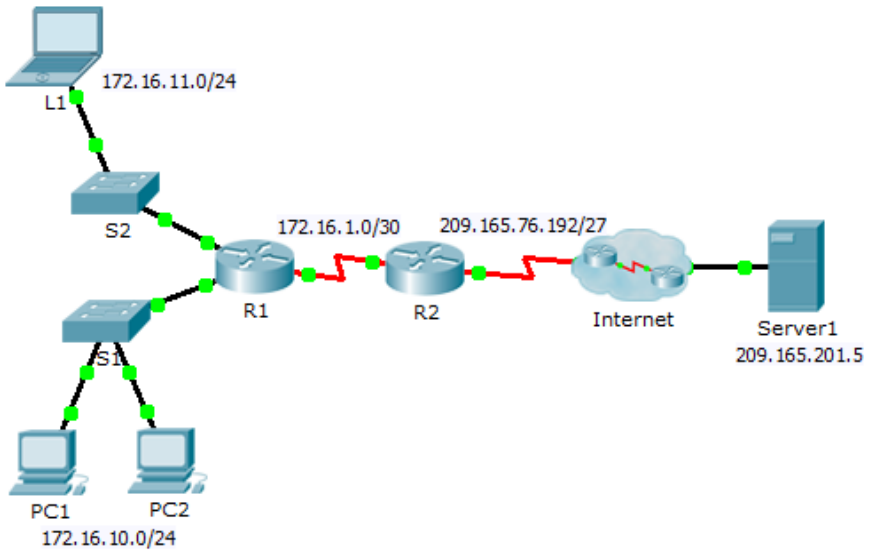
Q3) Fill the required information about RIPv2.

Element	RIPv2
Type of Protocol	Distant Vector
Path Metric	Hop Count
Hop Count Limit	15
Convergence	Slow
Updates	Periodic
Algorithm	Bellman-Ford

Part 3: Configuration and network analysis: ACL and NAT

Q1- Consider the following exhibit.

Access List and NAT:



Q1- List the types of Network Address Translation and define each one of them.

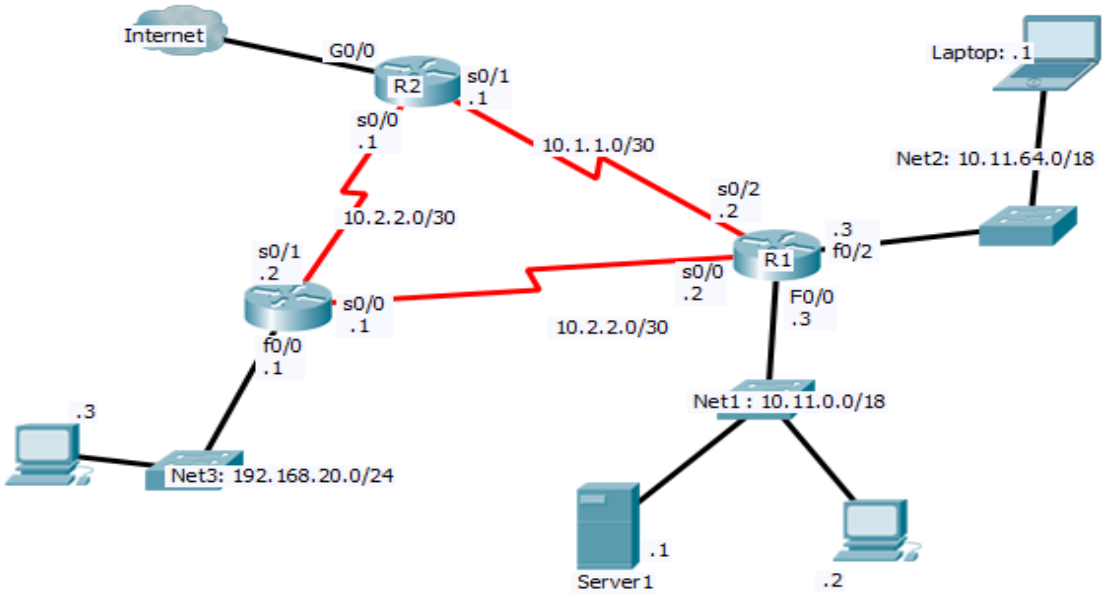
1. **Static NAT:** uses a one-to-one mapping of local and global addresses. These mappings are configured by the network administrator and remain constant.
2. **Dynamic NAT:** uses a pool of public addresses and assigns them on a first-come, first-served basis. When an inside device requests access to an outside network, dynamic NAT assigns an available public IPv4 address from the pool. Dynamic NAT requires that enough public addresses are available to satisfy the total number of simultaneous user sessions.
3. **Port Address Translation (PAT)** maps multiple private IPv4 addresses to a single public IPv4 address or a few addresses. PAT uses the pair source port and source IP address to keep track of what traffic belongs to what internal client.

Questions	Answers
Create a standard ACL on R2 that permits any PC from 172.16.10.0/24 from accessing Server1	`R2(config)# access-list 1 permit 172.16.10.0 0.0.0.255`
How to verify the connected ACL?	`R2#show access-lists`
Configure R2 with a NAT pool that uses all four addresses in the 209.165.76.196/30 address space.	`R2(config)# ip nat pool MyPool 209.165.76.196 209.165.76.199 netmask 255.255.255.252`
Associate ACL1 with the NAT pool	`R2(config)# ip nat inside source list 1 pool MyPool`

Configure R2 interfaces with the appropriate inside and outside NAT commands.	`R2(config)# interface s0/0/0`
	`R2(config-if)# ip nat outside`
	`R2(config-if)# interface s0/0/1`
	`R2(config-if)# ip nat inside`

How can you check all the NAT translations?	`R2# show ip nat translations`

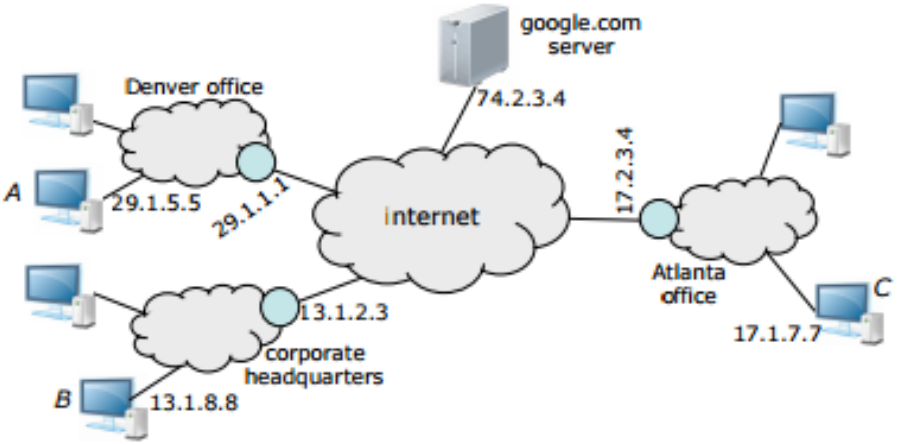
Q2- Consider the following topology:



The network administrator would like to implement NAT on R2 in order to validate a private addressing scheme, on inside hosts while accessing the Internet.

Requirement	Commands
Write the necessary statements to configure **Dynamic NAT** on R2 to enable the Internet access to Net1 and Net2 and Net3 ▪ Use a standard ACL number 10 ▪ Use **NAT-POOL** as the nat pool name. ▪ Use the available addresses in the 209.165.202.128/30 address space.	R2(config)# access-list 10 permit 10.11.64.0 0.0.63.255 R2(config)# access-list 10 permit 10.11.0.0 0.0.63.255 R2(config)# access-list 10 permit 192.168.20.0 0.0.0.255 R2(config)# ip nat pool NAT-POOL 209.165.202.129 209.165.202.130 netmask 255.255.255.252 R2(config)# ip nat inside source list 10 pool NAT-POOL R2(config)# interface S0/1 R2(config-if)# ip nat inside R2(config)# interface S0/0 R2(config-if)# ip nat inside R2(config)# interface g0/0 R2(config-if)# ip nat outside

Q3- The diagram at right shows a corporate network with three sites connected by the internet.



If host A sends a packet to host C, what are the source and destination address fields in the packet header as it passes through the public internet?

Source address is 29.1.1.1, destination address is 17.2.3.4.

Part 4: VLAN and Inter-VLAN routing

Exercise1: Theoretical part

MediaCo Company consists of one single floor that covers users from different networks: Admins, Staff and Visitors.

1. Suppose that we have only one switch of 24 ports. How many VLANS would you create?

3 VLANs for each network

2. In order to grant routing between VLANs, which device is required and what is the best methodology name?

Router, router on stick

3. Assume that we need to support only 15 Ports for the users from different VLANs. How do you secure unused ports?

By shutting down them

4. The company rents the second floor to expand their offices and they decided to use the same VLANS too on the new switch. What should be the configuration type of the ports used between the first switch and the second switch?

Trunk

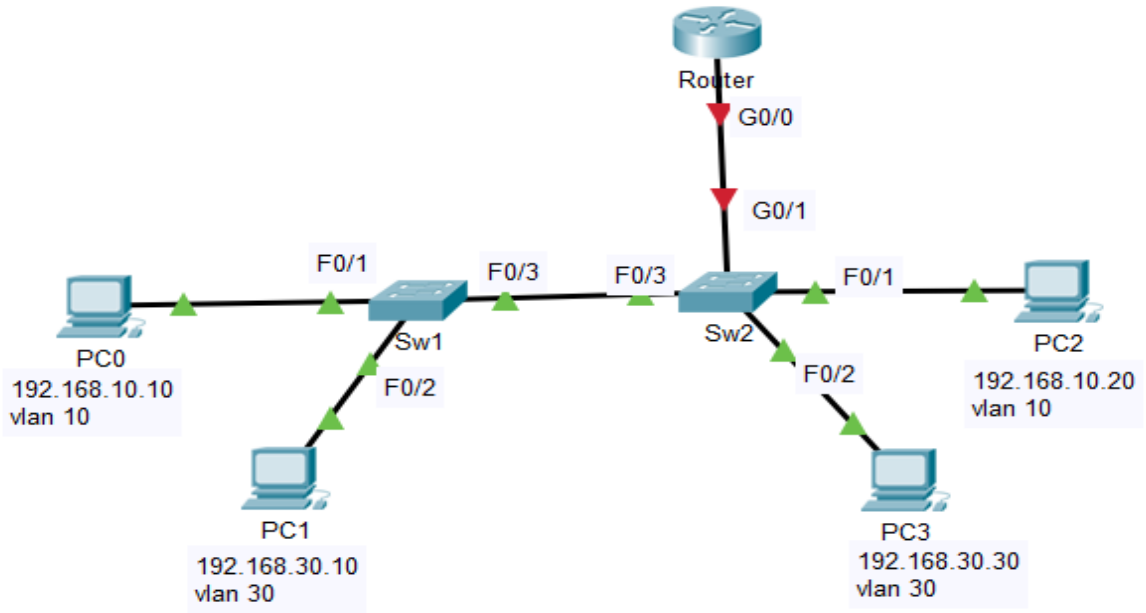
5. You noticed that after connecting both switches a mismatch error is appearing. What could be the configuration problem?

Native VLANs mismatch, Duplexing mode mismatch... or any other valid answer

6. Assume that a VLAN 10 user from the first-floor sent a broadcast frame, how the switch in the second-floor notes to which VLAN this frame belongs?

Through the VLAN ID included in the header

Exercise2: Analysis and Configurations



1. What type of Vlans should PCs 0,1,2,3 belong to?

   Data vlan

2. After vlans being created on Sw1 and Sw2.Write the appropriate configuration Vlans membership for F0/1 and F0/2 on Sw1 and Sw2

   Int F0/1
   Switchport mode access
   Switchport access vlan 10

   Int F0/2
   Switchport mod access
   Switchport access vlan 30

3. Connectivity between PC0 and PC2 has failed after vlans creation. Justify.
   The link between Switches should be configured as trunk.

4. Complete the configuration of F0/3 on both Sw1 and Sw2. Consider Vlan 90 as a Native vlan.
   Int F0/3
   Switchport mode trunk
   Switchport trunk native vlan 90

5. Trying connectivity between PC0 and PC3 has failed. How this should be achieved?
   Configure the router to provide inter-vlan routing.

6. What mode should be configured for G0/1 on Sw2?
   - Access
   - Trunk
   - Auto
   - Default

7. What is the advantage of router-on-a-stick inter VLAN routing?

   Router-on-a-stick inter-VLAN routing allows for one physical interface to route to multiple VLANs, when configuring it with subinterfaces, unlike the legacy inter-VLAN method which requires one port per VLAN.

8. Which interfaces would be the gateways for PC0 and PC3. Which IP addresses can be assigned to those interfaces?

   G0/0.10 for PC0 and G0/0.30 for PC3.

   192.168.10.1/24, 192.168.10.254, or any IP in the same subnet for PC0

   192.168.30.1/24, 192.168.30.254 or any IP in the same subnet for PC3.