BIRZEIT UNIVERSITY

Faculty of Information Technology

Computer Systems Engineering Department

Fall Semester 2016/ 2017

Computer Networks ENC539

First Hour Exam

Instructor: Imad Tartir Time: 60 minutes

KEY

Student's name: ______________________________

Student's ID #: ______________________________

Question	Grade
Question 1 [20 points]	
Question 2 [10 points]	
Question 3 [10 points]	
Question 4 [10 points]	
Total [50 Points]	

Good Luck

Question #1:

A) **True / False: (True= +2, False= -1, un-answered = 0, with minimum of 0)**

1.	Markov Queue use historical probabilities.	T
2.	When no route found matches the packet's destination address, the router will broadcast it to all its active interfaces.	F
3.	RIP routes have precedence over static routes	F
4.	210.23.33.0 255.255.254.0 is a valid IP address for a host	T
5.	If we have a point-to-point connection between routers, when sending a packet, the destination MAC address will be all 1s.	T
6.	Best fit route search requires more RAM and CPU power than first fit technique.	F

B) **Choose the best answer:**

1. **In Markov analysis, we are concerned with the probability that the**
   a. State is part of a system.
   b. System is in a particular state.
   c. Time has reached a steady state.
   d. Transition will occur.

2. Best fit Routes depends on:
   a. Longest match between destination IP address in the Packet and Network ID in routing table
   b. Shortest path in terms of number of routers on the way.
   c. Least cost in terms of metric
   d. A series of least congested links

3. When will RIP flush a dead route entry in the default values:
   a. Immediately.
   b. 30 seconds after the last update
   c. 180 seconds after the last update
   d. 240 second after the last update.

4. When a packet in the source machine is decided to be sent to a remote network, it is:
   a. Sent directly to the destination with the real destination IP.
   b. Sent with destination IP of the router
   c. Sent with source IP of the router
   d. Sent with destination MAC address of the router

5. To enhance RIP convergence time, the operator can
   a. Change the default timers to better values
   b. Use RIP V3
   c. Use triggered update
   d. A & C
   e. Merge network areas

Question #2:

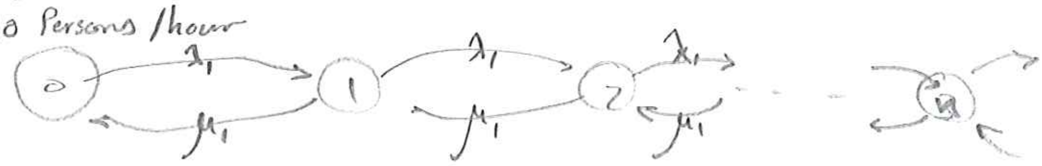
A bank has two gates that lead to a service area, this area offers two types of services. The first gate enters 12 clients per hour who need the first type of service and 3 clients per hour for the second type of service.
The second gate enters 15 clients per hour for the first type of service and 2 clients per hour for the second type of service.
The service desk of the first type of service serves a client every 2 minutes, whereas, the service desk of the second type of service helps 10 clients per hour.

1. Draw the state transition diagram of the system.
2. Calculate the average number of clients in the bank for the first type of service.
3. Calculate the average waiting time for a client to leave the bank for the first type of service.
4. Calculate the average number of clients in the bank for the second type of service.
5. Calculate the average waiting time for a client to leave the bank for the second type of service.
6. What is the probability of having exactly 6 clients waiting for the first type of service and 3 clients waiting for the second type of service?

$\lambda_1 = \lambda_{11} + \lambda_{12} = 12 + 15 = 27$ Person / hour

$\mu_1 = 30$ Persons / hour

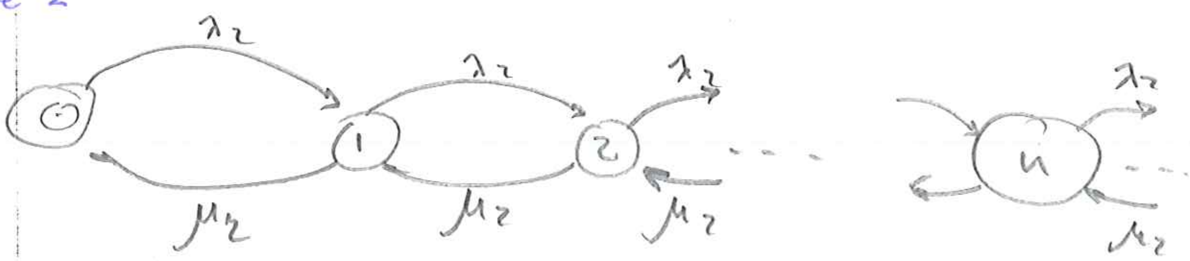
Service Type 1



$\lambda_2 = \lambda_{21} + \lambda_{22} = 3 + 2 = 5$ Clients / hour

$\mu_2 = 10$ Clients / hour

Service Type 2



$N = \frac{\lambda}{\mu - \lambda}$, $T = \frac{1}{\mu - \lambda}$

$N_1 = \frac{27}{30-27} = \frac{27}{3} = 9$ clients , $T_1 = \frac{1}{30-27} = \frac{1}{3}$ hours

$N_2 \; \frac{5}{10-5} = 1$ client , $T_2 = \frac{1}{10-5} = \frac{1}{5}$ hours.

for Service Type 1

$$P_n = \rho^n (1-\rho) \qquad \rho = \frac{\lambda}{\mu} = \frac{27}{30} = 0.9$$

$$P_n = (0.9)^n (0.1) \quad \Rightarrow P_4 = (0.9)^4 (0.1) = 0.06561$$

for the Second $\rho = \frac{5}{10} = 0.5$

$$P_n = (0.5)^n (0.5)$$

$$P_3 = (0.5)^3 (0.5) = 0.0625$$

According to Jackson's Therorem.

$$P_1(n_1) \cdots P_m(n_m) = \prod_{i=1}^{m} P_i(n_i)$$

$$\Rightarrow P_1(4) P_2(3) = P_1(4) * P_2(3)$$

$$= 0.06561 * 0.0625$$

$$= 0.0041$$

Question #3:

In a company, you have a high speed local area network that serves 5 different departments as follows:

- Sales: 20 employees, each has a PC and 50% of them have hand held smart devices.
- Engineering: 26 employees, each has a PC and smart device.
- Accounting: 10 employees, each has a PC, smart devices are not allowed here.
- Logistics: 6 employees, each has a hand held device.
- Management: 3 employees and the CEO, each has a PC, the CEO has a smart device. and PC

You are assigned the following range if IP addresses:

1. Design an IP addresses scheme for the network departments, so that each department has its independent network.
2. Sketch a block diagram for the network.
3. When connecting the main router to an ISP, what is/are the static route statement/s you need to enable all network clients access the internet.

# of hosts in each department:

Sales : 20 + 10 = 30 + 1 for router

Engineering : 26 + 26 = 52 + 1 for router

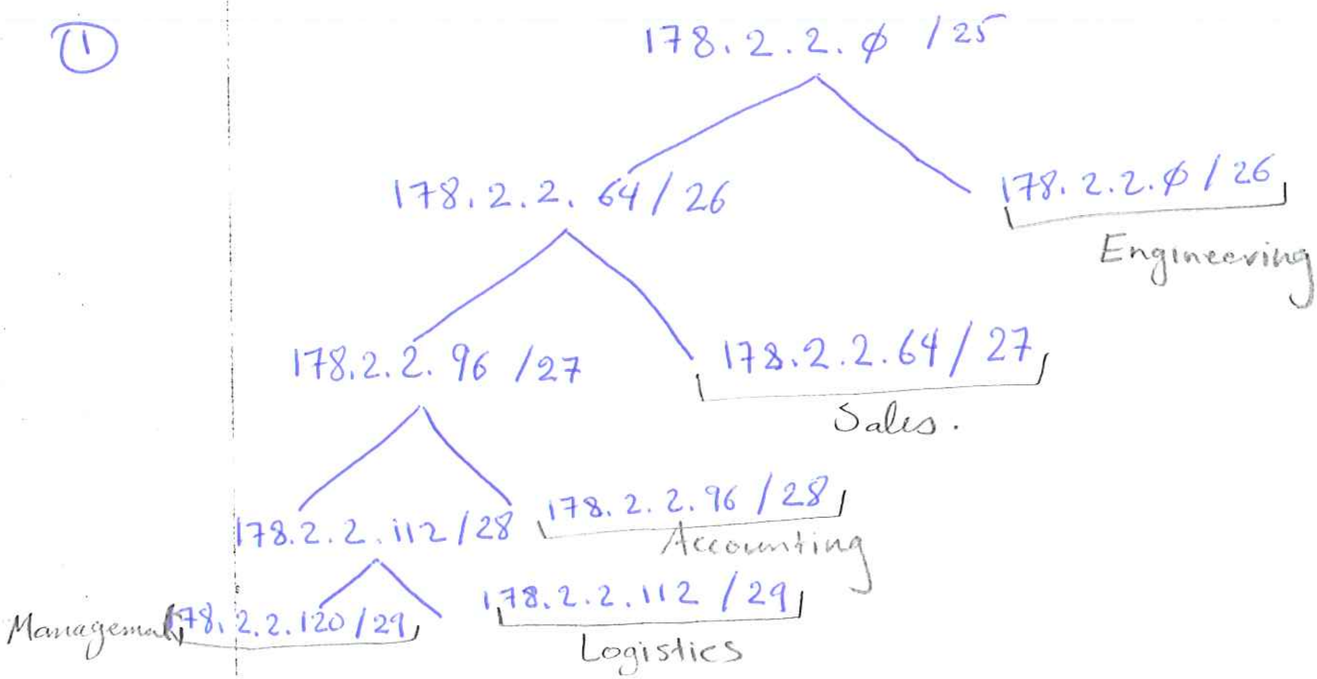
Accounting : 10 + 1 for router

Logistics : 6 + 1 for router

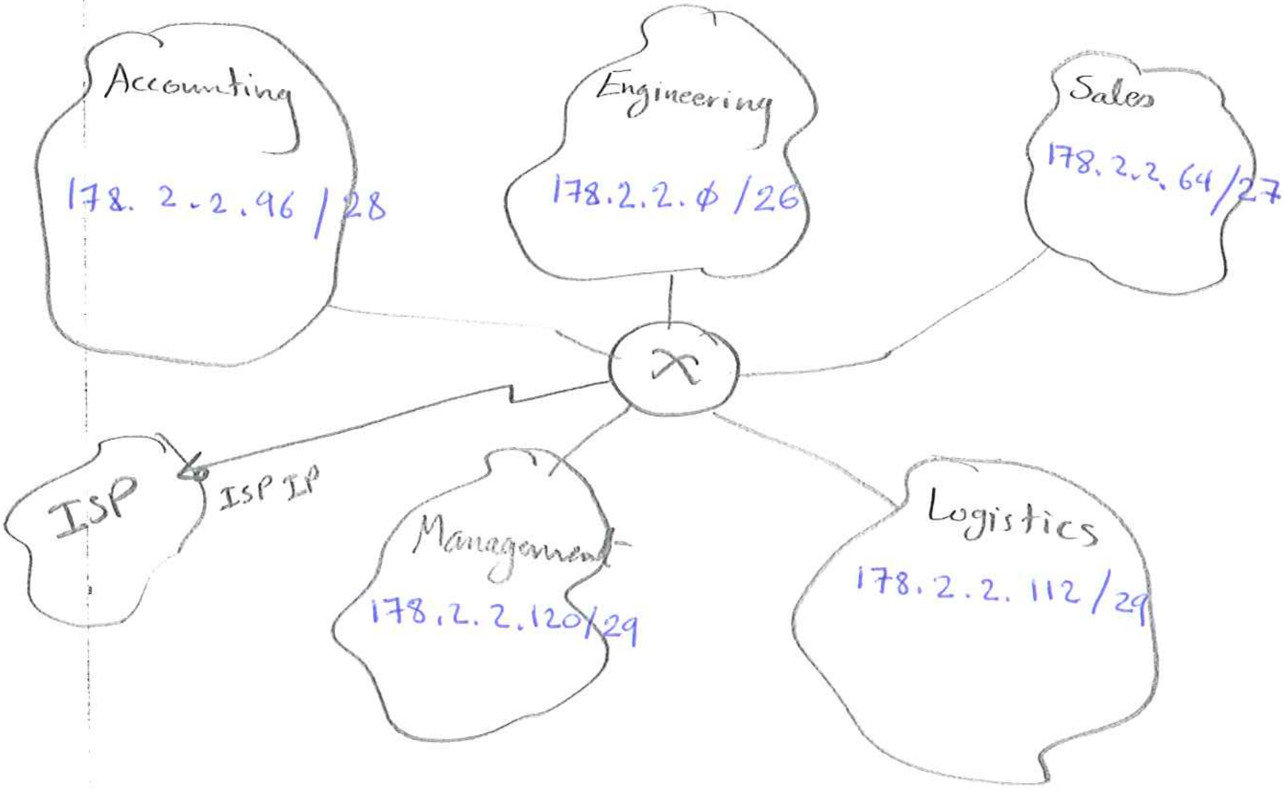
Management : 5 + 1 for router

given 178.2.2.0 /25 ⇒ 128 IP addresses.

(1)



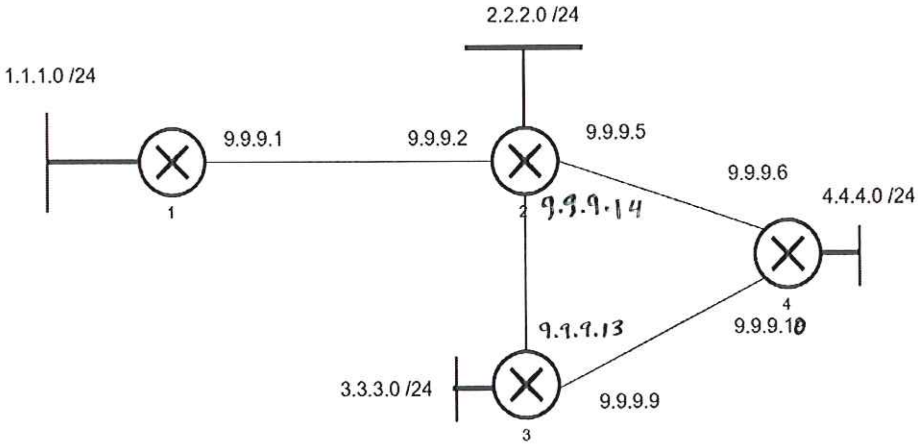
②



③ 0.0.0.0. 0.0.0.0 ISP IP.

Question #4:

A) Static Routing:



In the above diagram, write a **minimal** static routing policy (table) for each of the routers to make all networks accessible form everywhere.

Syntax:	Network ID	Netmask	NextHop
①	2.2.2.ϕ	255.255.255.ϕ	9.9.9.2
	3.3.3.ϕ	255.255.255.ϕ	9.9.9.2
	4.4.4.ϕ	255.255.255.ϕ	9.9.9.2
②	1.1.1.ϕ	255.255.255.ϕ	9.9.9.1
	3.3.3.ϕ	255.255.255.ϕ	9.9.9.13
	4.4.4.ϕ	255.255.255.ϕ	9.9.9.6
③	ϕ.ϕ.ϕ.ϕ	ϕ.ϕ.ϕ.ϕ	9.9.9.14
④	ϕ.ϕ.ϕ.ϕ	ϕ.ϕ.ϕ.ϕ	9.9.9.5

} ⇒ 0.0.0.0 0.0.0.0 9.9.9.2

B) In RIP protocol:

1. what is the "count to infinity" problem?

2. explain a solution for this problem?

1.

Count to infinity happens after RIP converges in the above network and router 1 looses connectivity with Net 1

in this case router ② tells router ③ it can reach Net 1 through ~~me~~ me. when ~~the~~ router ③ sends update, it returnes the entry to ~~router②~~ router②,

when the entry expires + fulshed in router ② it still receives updates from router ③ telling "you can reach Net 1 through me".

router ② and ③ start sending uppdates to each orther with increasing the hop count.

2. Split horizon: don't send back route entries,

Poison Reverse: send back with hop count = 15

So it is not reachable through me.