Homework 5

Quiz, 15 questions

<div style="border:1px solid #000; display:inline-block; padding:8px 20px; text-align:center;">1
point</div>

1.

In an asynchronous system, the Paxos protocol: (1 point)

○   Is always guaranteed to converge within a time bound

○   Is always safe

○   Shows that the Impossibility of Consensus (FLP) result is wrong

○   Is always live

<div style="border:1px solid #000; display:inline-block; padding:8px 20px; text-align:center;">1
point</div>

2.

One of your friends claims that the consensus protocol discussed in lecture for synchronous systems, will also solve consensus in asynchronous systems. You say to your friend: (1 point)
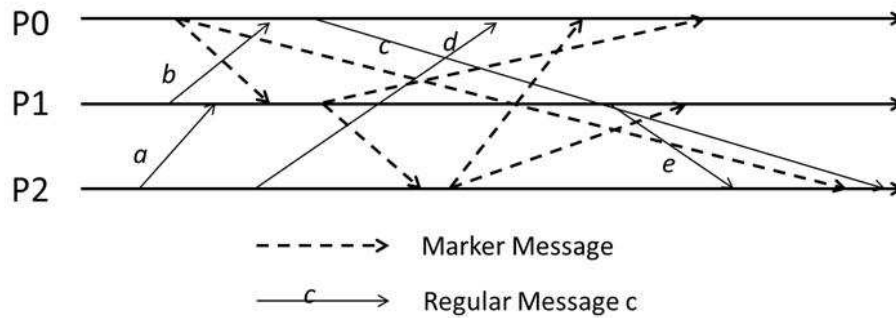
○   Yes, but only if you set f=N.

○   The protocol does not even work for synchronous systems

○   No, because message delays are unbounded in an asynchronous system, the discussed proof will not work because one cannot assume that two non-faulty processes can send a message to each other during a round

○   Yes, you're right!

<div style="border:1px solid #000; display:inline-block; padding:8px 20px; text-align:center;">1
point</div>
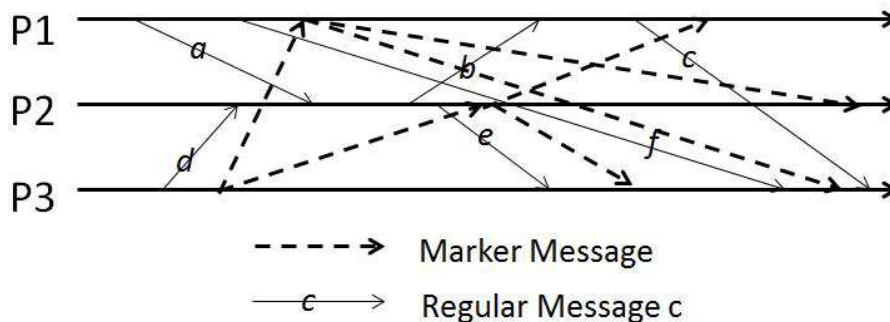
3.

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For the run of the Chandy-Lamport algorithm, answer the following question. Wherever you have to write your answer as a list, give a comma-separated list in alphabetical order. (1 point)

- The list of all messages (among a-e) captured by the snapshot as a part of channel states is:

> b,c,d

```
 1
point
```

4.

For the run of the Chandy-Lamport algorithm, answer the following question. (1 point)

- Consider all messages such that both its send and receive events are present as part of the state of some process captured by the snapshot. The number of such messages is:
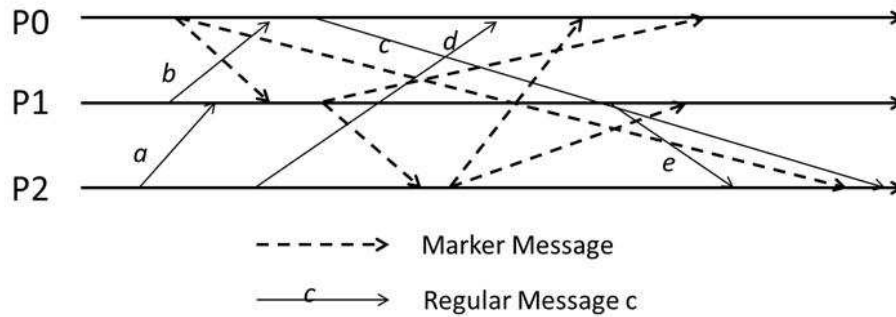
> 1

```
 1
point
```

5.

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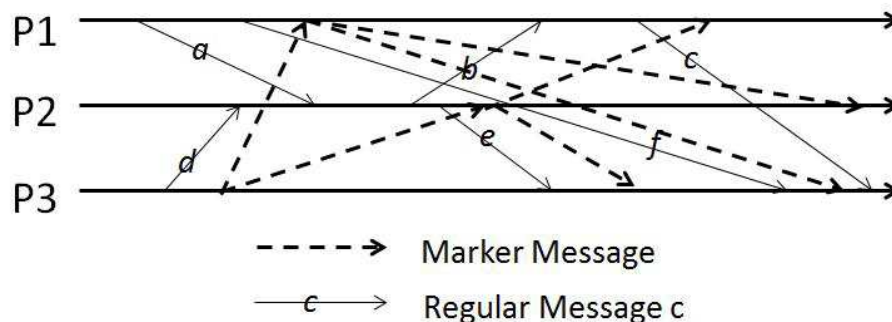- - - - - →   Marker Message

——c——→   Regular Message c

For the run of the Chandy-Lamport algorithm, answer the following question. (1 point)

- The number of messages such that both its send and receive happen causally after the snapshot is:

```
2
```

1 point

6.

- - - - →   Marker Message

——c——→   Regular Message c

For the run of the Chandy-Lamport algorithm, answer the following question. (1 point)

- The number of messages such that its send happens causally after the snapshot but its receive is before the snapshot is:
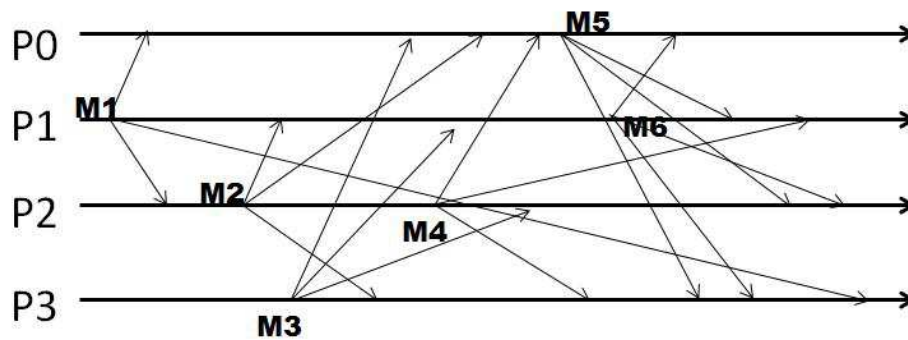
```
0
```

1 point

7.

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A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using FIFO ordering for multicasts. All sequence numbers start with zeros.

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Answer the following question. (1 point)

- The sequence vector at the end of the run at P0, as a comma-separated list (without the brackets), is:

> 1,2,2,1

> 1
> point

8.

A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using FIFO ordering for multicasts. All sequence numbers start with zeros.

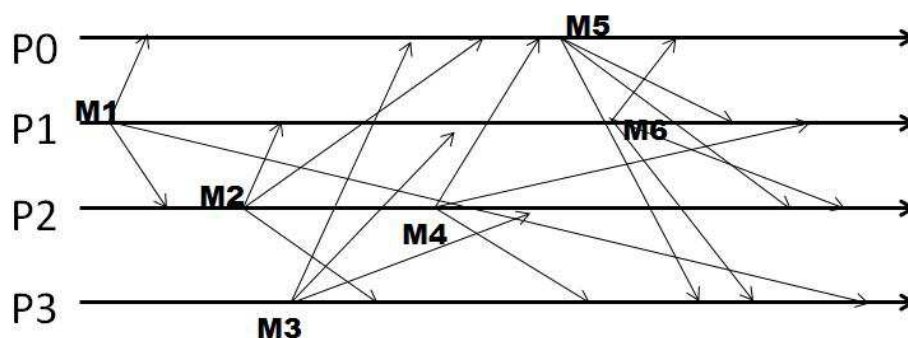Answer the following question. (1 point)

- The sequence vector associated with the send event of the only multicast that P3 sends out, as a comma-separated list (without the brackets), is:
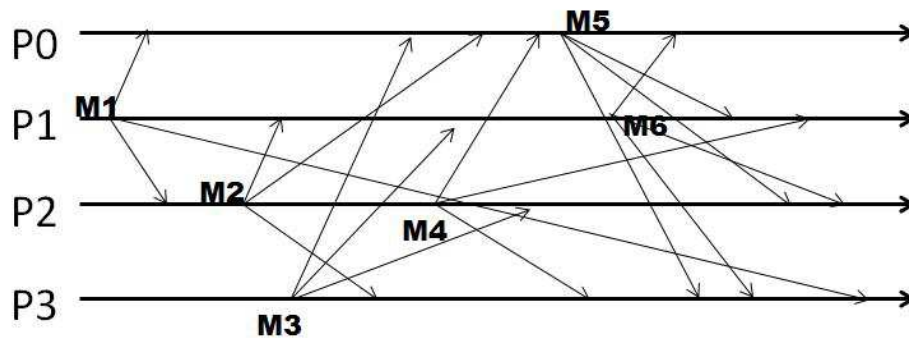
> 0,0,0,1

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> 1
> point

9.

A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using FIFO ordering for multicasts. All sequence numbers start with zeros.

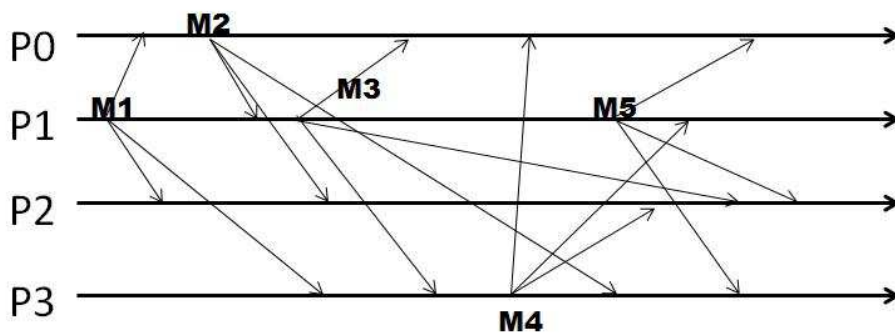Answer the following question. (1 point)

- The sequence vector at the end of the run at P2, as a comma-separated list (without the brackets), is:

> 1,2,2,1

> 1
> point

10.

A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using FIFO ordering for multicasts. All sequence numbers start with zeros.

Answer the following question. (1 point)

- The total number of multicasts that are buffered across all processes in this entire run is:
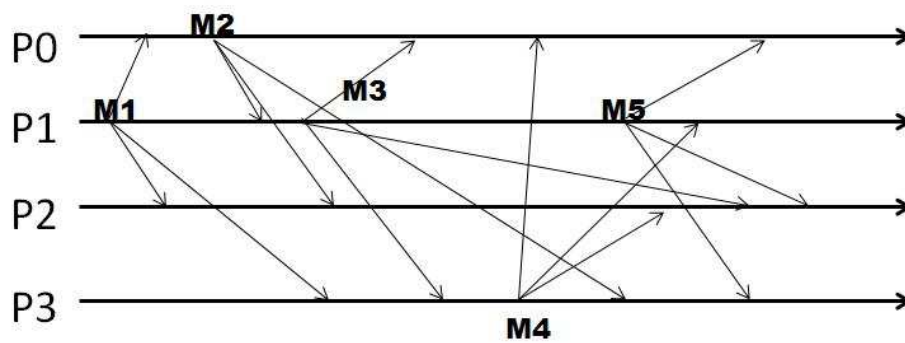
| 0 |

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| 1 |
| point |

11.
A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using causal ordering for multicasts. All sequence numbers start with zeros.

Answer the following question. (1 point)

- The vector of sequence numbers for the only multicast that P0 sends out, as a comma-separated list (without the brackets), is:
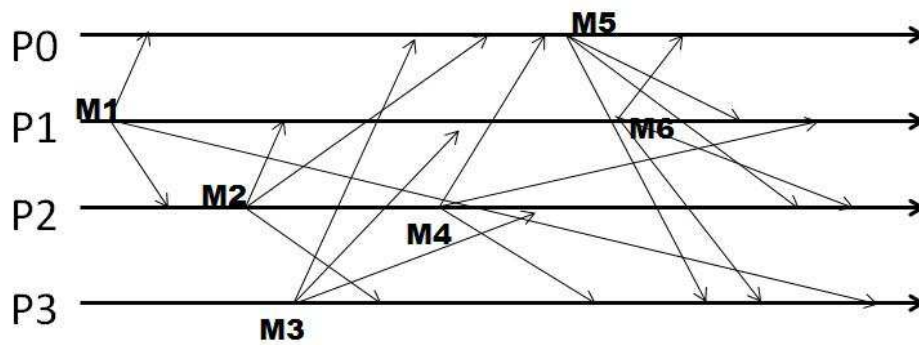
| 1,1,0,0 |

| 1 |
| point |

12.

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A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using causal ordering for multicasts. All sequence numbers start with zeros.

Answer the following question. (1 point)

- The sequence vector at the end of the run at P2, as a comma-separated list (without the brackets), is:

0,1,0,1

1
point

13.

A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using causal ordering for multicasts. All sequence numbers start with zeros.

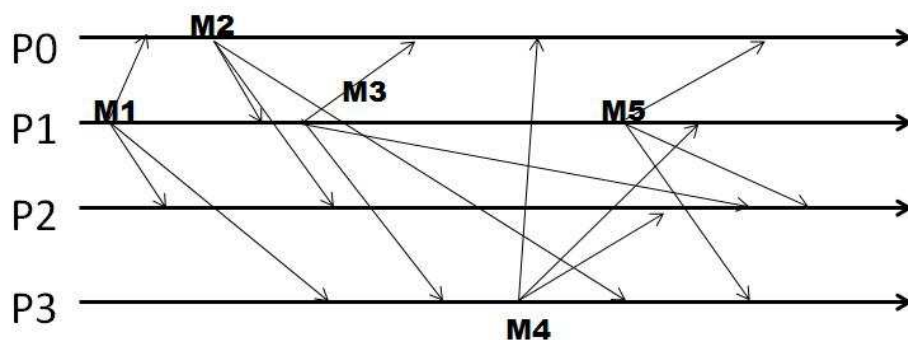Answer the following question. (1 point)

- The sequence vector associated with the send event of the last (i.e., third) multicast that P1 sends out, as a comma-separated list (without the brackets), is:
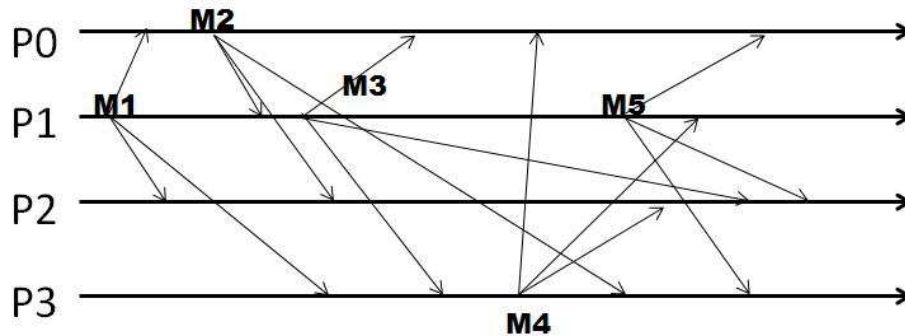
1,3,0,0

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| 1 |
| point |

14.

A group of four processes P0-P3 sends out multicasts in a run as shown below. The group is using causal ordering for multicasts. All sequence numbers start with zeros.

Answer the following question. (1 point)

- The total number of multicasts that are buffered across all processes in this entire run is:

| 1 |

| 1 |
| point |

15.

A group of 3 processes, P1 through P3, is running virtual synchrony. In this run, initially all three processes have the view {P1,P2,P3}. In this view a single multicast M is sent by process P2. Following this, P2 crashes, and thereafter P1 and P3 deliver a new view containing only {P1,P3}. Which of the following scenarios DO NOT satisfy virtual synchrony? **Please select all correct answers, as there are multiple correct answers.** (1 point)

- [ ] M is never delivered by P1 or P3.

- [ ] M is delivered by P3 in the view {P1,P2,P3} and by P1 in the view {P1,P3}.

- [ ] M is delivered by both P1 and P3 in the view {P1,P3}.

- [ ] M is delivered by both P1 and P3 in the view {P1,P2,P3}.

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