1. Consider a system with a total of 150 units of memory, allocated to three processes as shown:

Process	Claim	Allocation
1	70	45
2	60	40
3	60	15

Apply the ***banker's algorithm*** to determine whether it would be safe to grant each of the following requests. If yes, indicate a sequence of terminations that could be guaranteed possible.

a) A fourth process arrives, with a maximum memory need of 60 and an initial need of 25 units.

b) A fourth process arrives, with a maximum memory need of 60 and an initial need of 35 units.

2. Apply the ***deadlock detection algorithm*** to the following data and show the results.

R1	R2	R3	R4
2	1	0	0

Available vector V

	R1	R2	R3	R4
P1	0	0	1	0
P2	2	0	0	1
P3	0	1	2	0

Allocation matrix A

	R1	R2	R3	R4
P1	2	0	0	1
P2	1	0	1	0
P3	2	1	0	0

Request matrix Q

3. Suppose that there are two types of philosophers. One type always picks up his left fork first (a "lefty") and the other type always picks up his right fork first (a "righty"). Their behavior are as follows.

Lefty:
```
while (true) {
	think();
	wait (fork[i]);
	wait (fork[(i+1) mod 5]);
	eat();
	signal (fork[(i+1) mod 5]);
	signal (fork[i]);
}
```

Righty:
```
while (true) {
	think();
	wait (fork[(i+1) mod 5]);
	wait (fork[i]);
	eat();
	signal (fork[i]);
	signal (fork[(i+1) mod 5]);
}
```

Show that any seating arrangement with at least one of each type avoids deadlock.

Self-test

1. _________ strategies are very conservative and solve the problem of deadlock by limiting access to resources and by imposing restrictions on processes.
A. Deadlock prevention
B. Deadlock detection
C. Deadlock diversion
D. Deadlock avoidance

2. __________ allows the three necessary conditions but makes judicious choices to assure that the deadlock point is never reached.
A. Deadlock prevention
B. Deadlock detection
C. Deadlock diversion
D. Deadlock avoidance

3. The _________ condition can be prevented by requiring that a process request all of its required resources at one time and blocking the process until all requests can be granted simultaneously.
A. mutual exclusion
B. hold and wait
C. circular wait
D. no preemption

4. The __________ condition can be prevented by defining a linear ordering of resource types.
A. hold and wait
B. no preemption
C. mutual exclusion
D. circular wait

5. In the banker's algorithm, a safe state is defined as one in which _________.
A. At least one potential process sequence does not result in a deadlock
B. All potential process sequences do not result in a deadlock:
C. Several potential process sequences do not result in a deadlock:
D. None of the above

6. A strategy for dealing with deadlocks that allows the presence of deadlock is called _________.
A. Deadlock Prevention
B. Deadlock Avoidance
C. Deadlock Detection
D. None of the above