1\. 1) False.

2) True.

3) True. $\sigma_{a=5}(R)$ is 0.

4) True.

5) True.

6) False.

7) True.

8) True.

9) False.

10) True.

* Exam questions answered out of order!

2\. 1) Select A.name, A.age
From Artist A, Recording R, Tracks T
Where A.ssn = R.ssn AND R.tno = T.tno
AND T.tname = 'Sacramento Memorial Auditorium';
AND R.date IS NOT NULL;

CONT'D

(Cont'd)

2. 2) Select A.Name
From Artist A, Theater T, Perform P
Where A.SSN = P.SSN AND P.Tno = T.Tno
AND T.name = 'Sacramento Memorial Auditorium'
AND P.date = '05/16/2022';

3) Select AVG(A.age)
From Artist A, Theater T, Perform P
Where A.SSN = P.SSN And P.Tno = T.Tno
And T.name = 'Sacramento Memorial Auditorium'
Group By P.SSN
Having Count(P.date) >= 3;

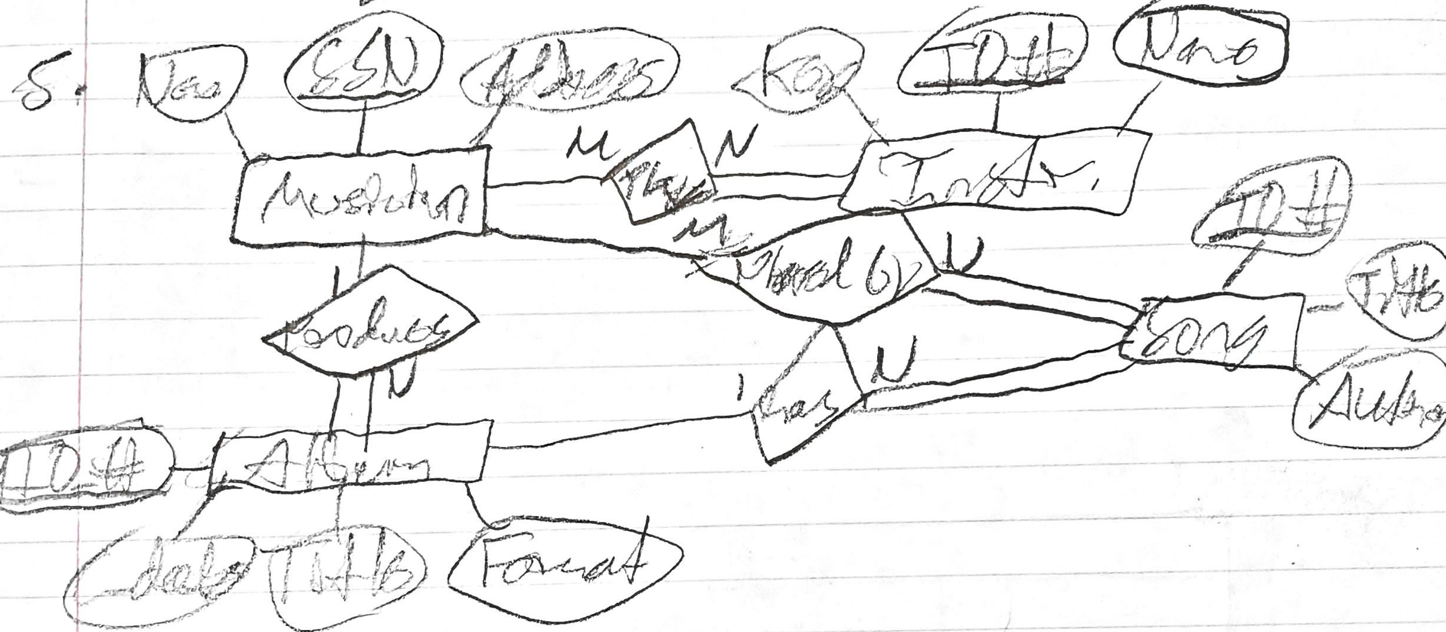
4) Select A.Name
From Artist A
Where A.rating > (Select Avg(A.rating)
From Artist A);

5) Select T.name
From Theater T, Perform P
Where T.tno = P.tno AND (P.date Between
'5/16/22' AND '05/26/22')
Group by T.tno
Having Count(P.date) > 35;

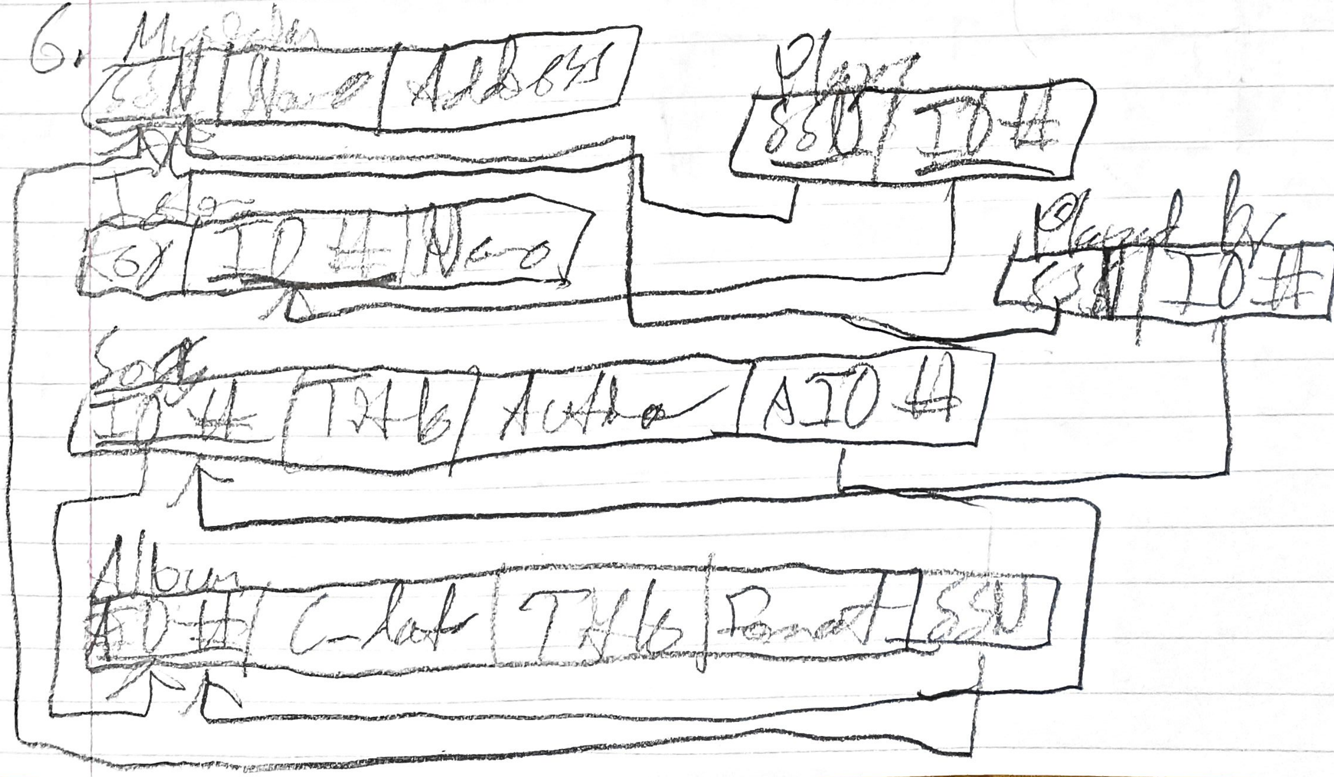
3. 1) Update Production
Set Price = Price + Price*0.10
Where date = 5/16/2022;

2) Delete From Production
Where date = 5/16/2022;

5.



6.



8. records = 1997
record size 113 bytes = R
block size = 512 bytes
seek time = 30 msec
rotational delay = 10 msec
data transfer = 512 bytes/msec

1) Blocking factor = 512/113 = **4 (rounded down)**
# of data blocks = 1997/4 = **500 (rounded up)**

3) avg time for linear search, 0.5 * blocks

30 + 10 + 10(512/512)

30 + 10 + (0.5 * 500) * 1 = **290 ms**

9.

	is key	is non key
Physical order field	Primary index	Clustering index
Not physical order	Secondary index (key)	Secondary index (non-key)

3. Database normalization is a "Proliferation" process where we improve database design or reality. It achieves a higher normal form. We do this by breaking down a relation into smaller relations step by step. We also keep the following principles in mind: common attributes of relations must be either foreign key or primary key, there is no loss of attributes, as well as functional dependencies are to be preserved as possible. We usually want to achieve 3NF and BCNF normal forms in our database normalization.

4.

$Detail1 \leftarrow \sigma_{Date='5/16/2022'}(Booking)$

$Detail2 \leftarrow \sigma_{name='Sacramento\ Memorial\ Auditorium'}(Theater)$

$D3 \leftarrow (Detail1 \bowtie_{B.Tno=T.Tno} Detail2)$

$D4 \leftarrow (Account \bowtie_{A.SSN=B.SSN} D3)$

$Result \leftarrow \pi_{Name}(D4)$