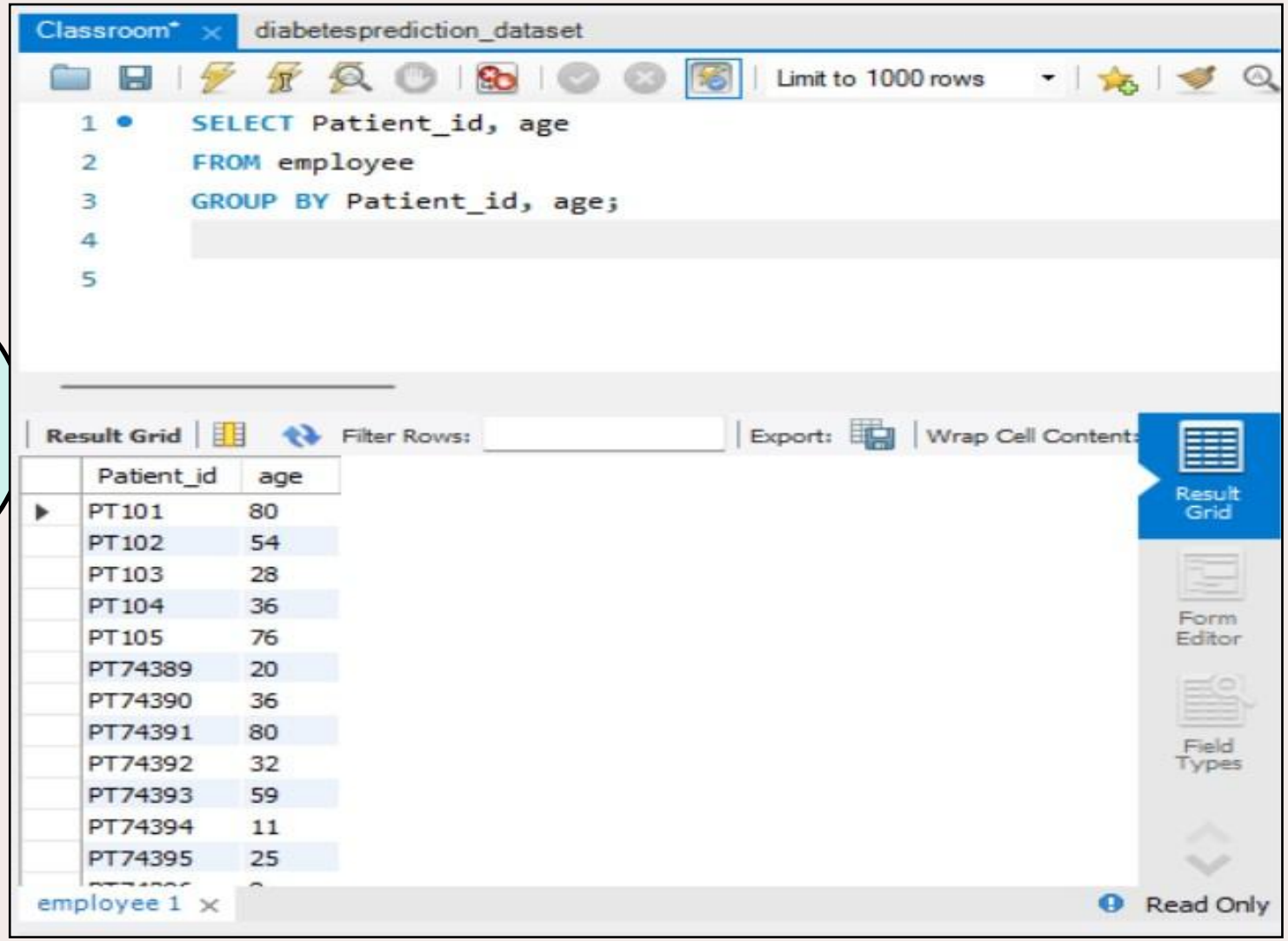
DATA ANALYST INTERNSHIP

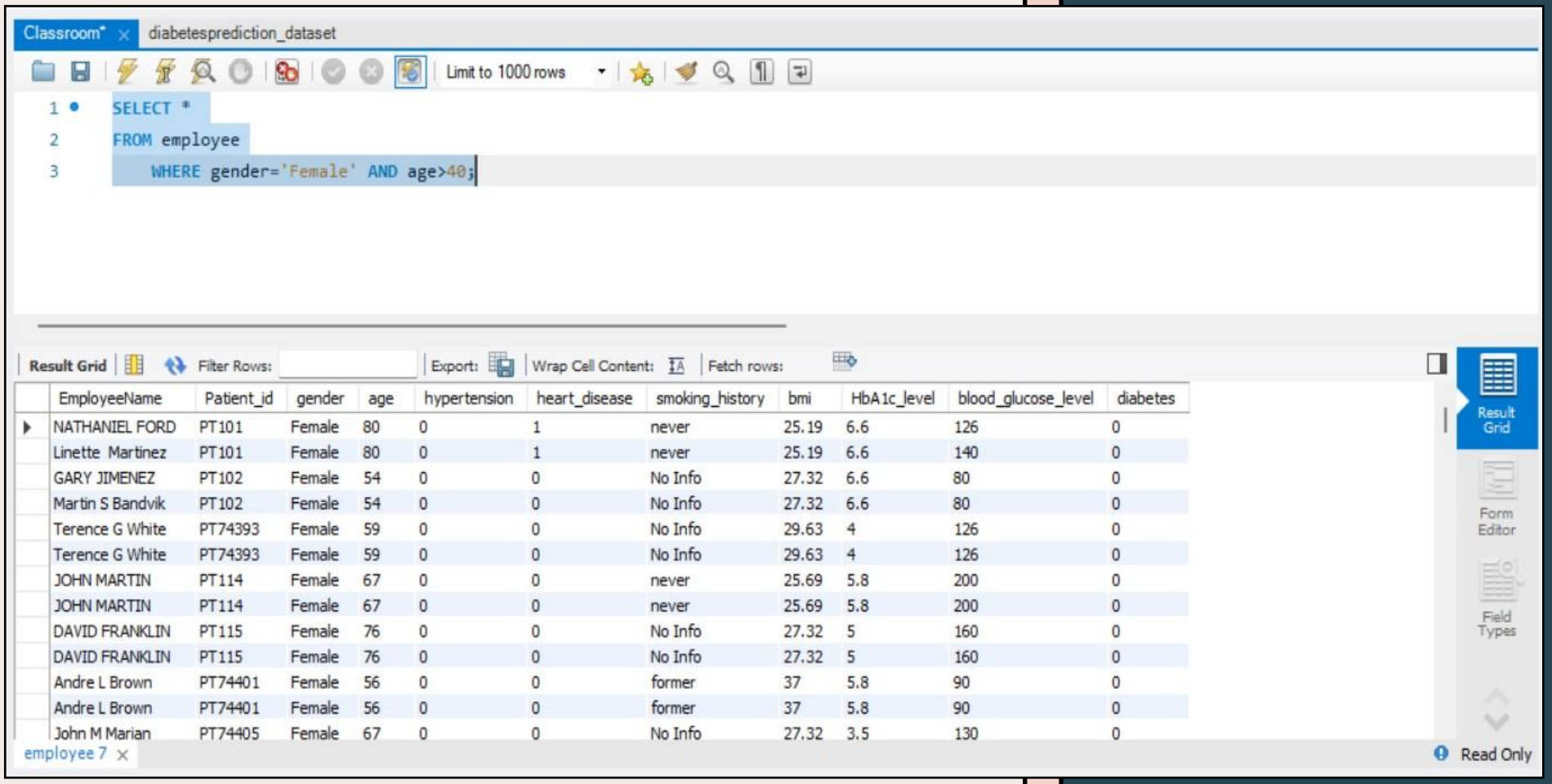
TASK-3
DIABETES PREDICTION DATASET

BY :- SWARNAV KUMAR

Retrieve the Patient_id and ages of all patients.

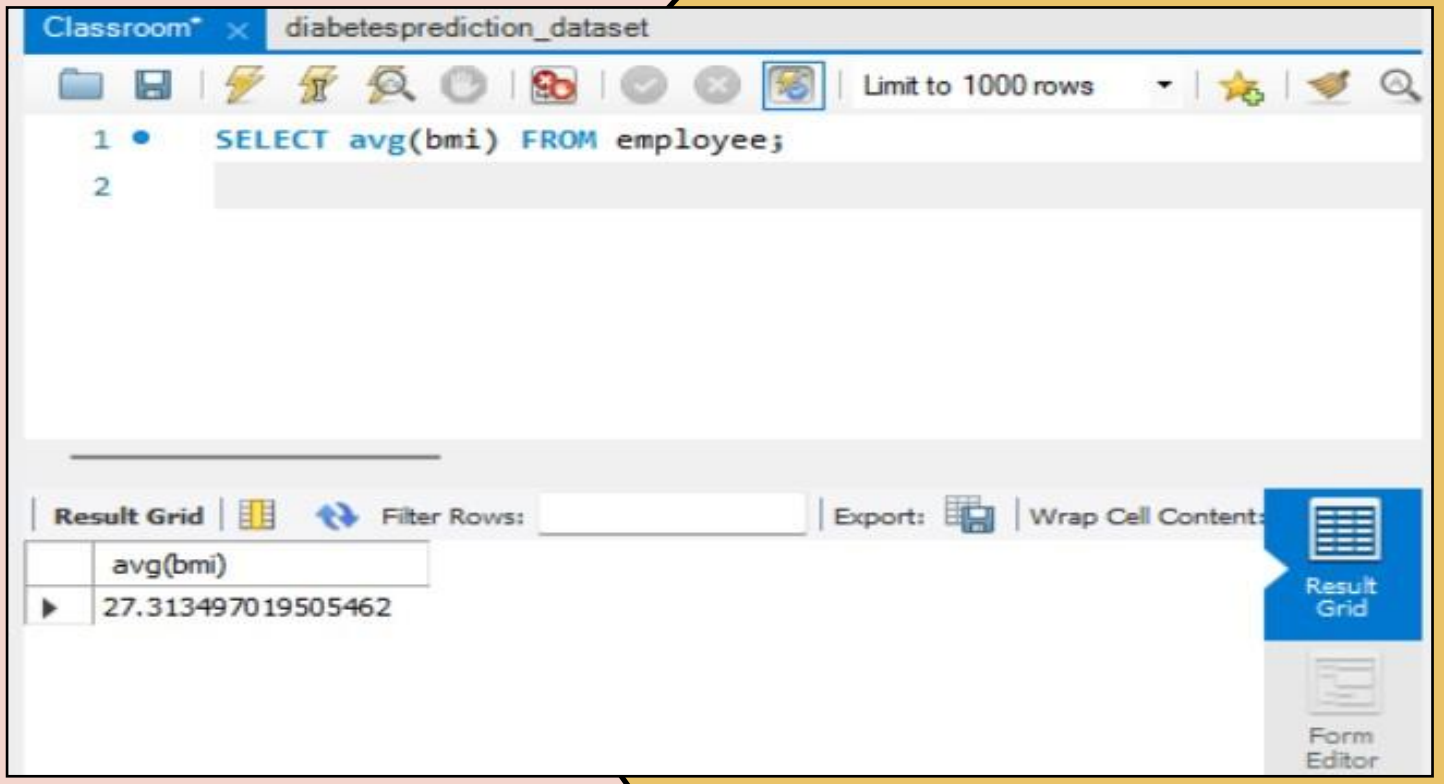


Select all female patients who are older than 40.



EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
NATHANIEL FORD	PT101	Female	80	0	1	never	25.19	6.6	126	0
Linette Martinez	PT101	Female	80	0	1	never	25.19	6.6	140	0
GARY JIMENEZ	PT102	Female	54	0	0	No Info	27.32	6.6	80	0
Martin S Bandvik	PT102	Female	54	0	0	No Info	27.32	6.6	80	0
Terence G White	PT74393	Female	59	0	0	No Info	29.63	4	126	0
Terence G White	PT74393	Female	59	0	0	No Info	29.63	4	126	0
JOHN MARTIN	PT114	Female	67	0	0	never	25.69	5.8	200	0
JOHN MARTIN	PT114	Female	67	0	0	never	25.69	5.8	200	0
DAVID FRANKLIN	PT115	Female	76	0	0	No Info	27.32	5	160	0
DAVID FRANKLIN	PT115	Female	76	0	0	No Info	27.32	5	160	0
Andre L Brown	PT74401	Female	56	0	0	former	37	5.8	90	0
Andre L Brown	PT74401	Female	56	0	0	former	37	5.8	90	0
John M Marian	PT74405	Female	67	0	0	No Info	27.32	3.5	130	0

Calculate the average BMI of patients.



List patients in descending order of blood glucose levels.

Classroom* | diabetesprediction_dataset

Limit to 1000 rows

```
1  SELECT *
2  FROM employee
3  ORDER BY blood_glucose_level DESC;
```

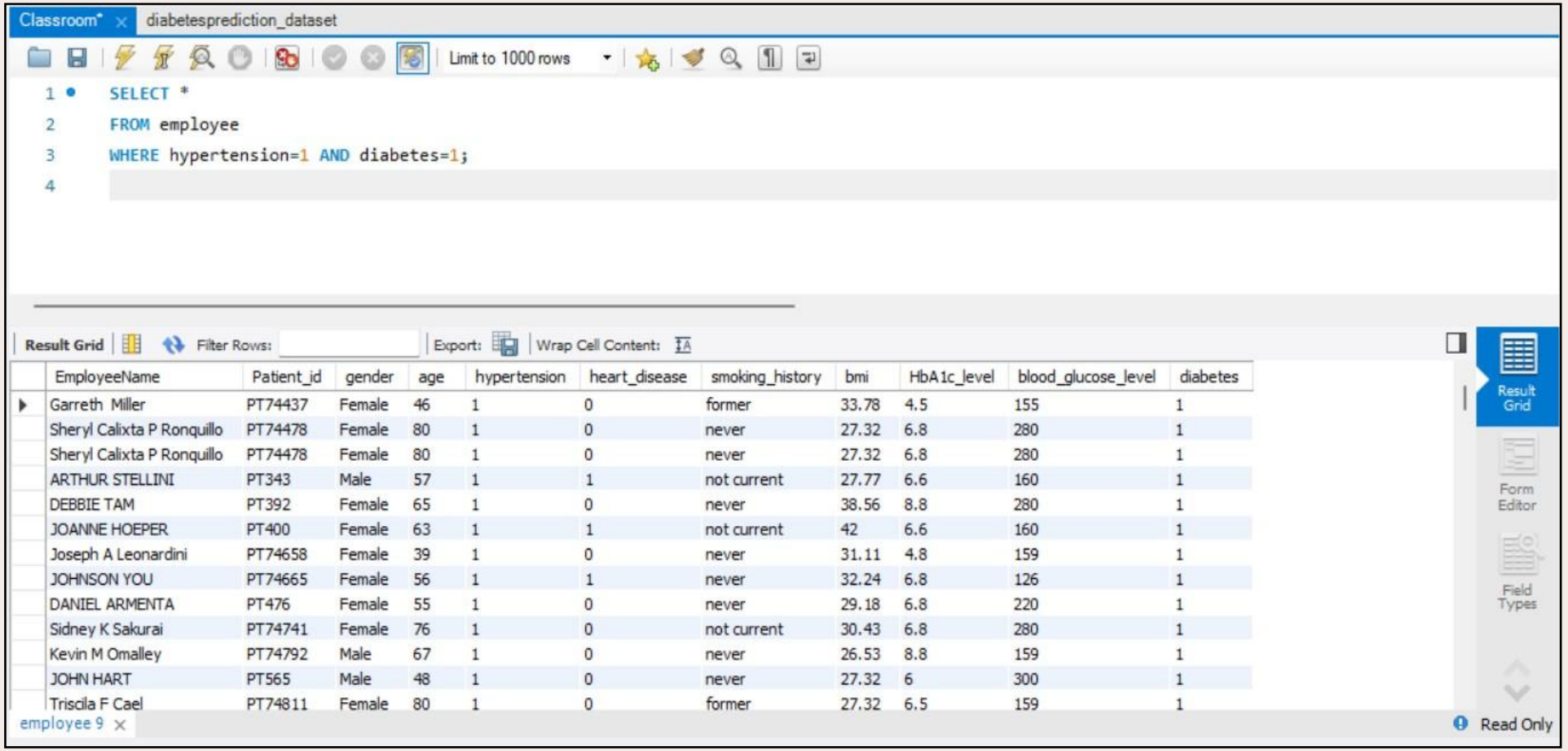
Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
GLORIA CARLOS	PT19277	Male	42	0	0	never	29.26	6	300	1
MARVIN MOUTON	PT19284	Male	41	1	0	former	27.32	6.1	300	1
Maurice R Munsell	PT92530	Male	64	0	0	not current	30.2	6.6	300	1
Edson Marquez	PT92581	Male	68	0	0	never	31.65	7.5	300	0
DIANE CHEW	PT92581	Male	68	0	0	never	31.65	7.5	300	1
John J Delfin	PT92677	Female	13	0	0	No Info	21.73	9	300	1
Patricia Barragan	PT92758	Female	41	0	1	never	23.5	5.7	300	1
Susan A Salvador	PT92859	Male	80	0	0	never	34.61	7	300	1
ANDREA PITTMAN	PT19642	Female	12	0	0	never	53.4	5.8	300	1
Karima C Baptiste	PT92895	Female	80	0	0	never	24.12	5.8	300	1
LAURA KIDD	PT13300	Female	40	0	0	current	33.25	5.7	300	1
LAURA KIDD	PT13300	Female	40	0	0	current	33.25	5.7	300	1
Haroon A Razzak	PT86611	Female	32	0	1	former	25.59	9	300	1

Result Grid | Form Editor | Field Types | Read Only

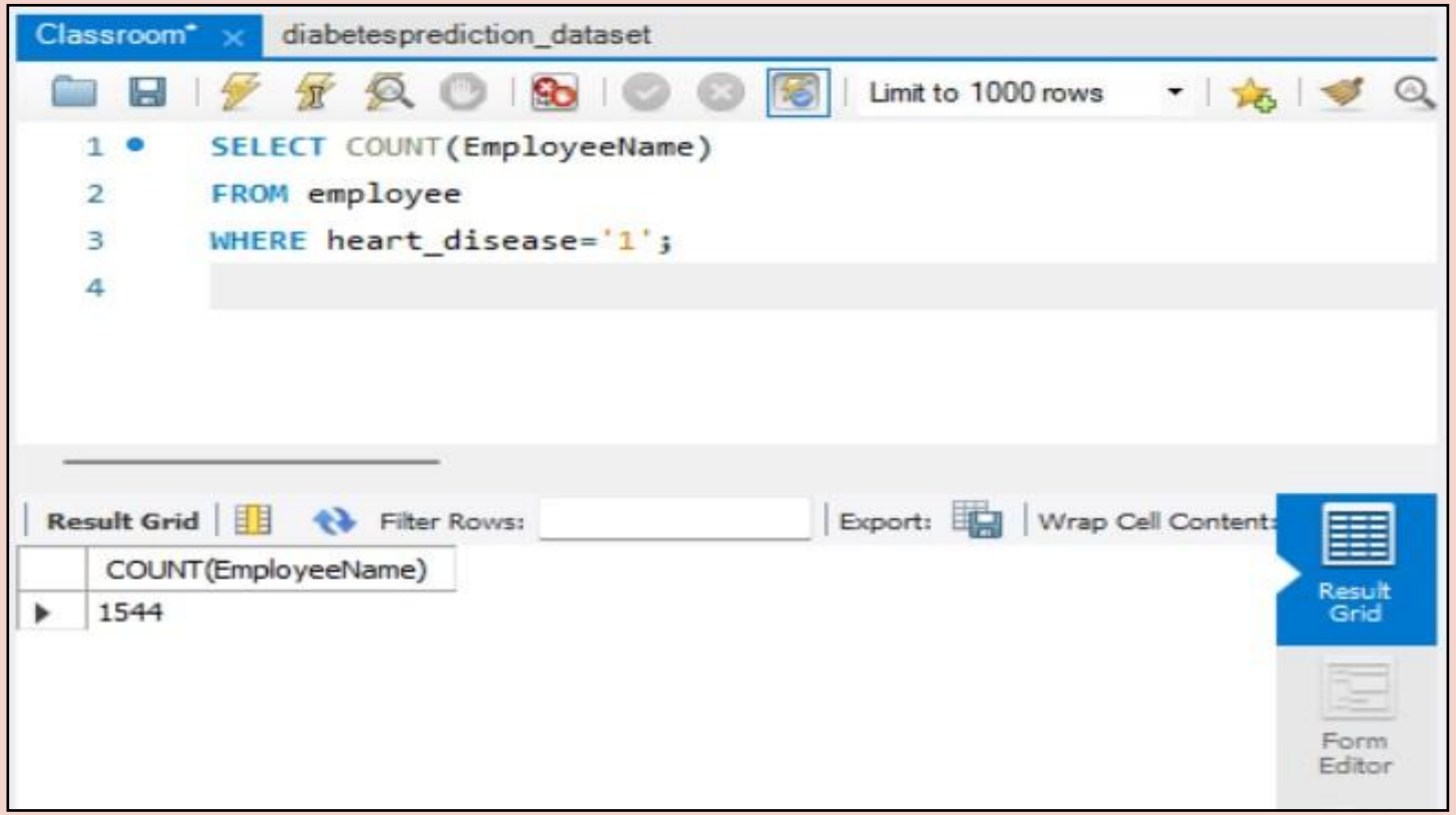
employee 6

Find patients who have hypertension and diabetes.

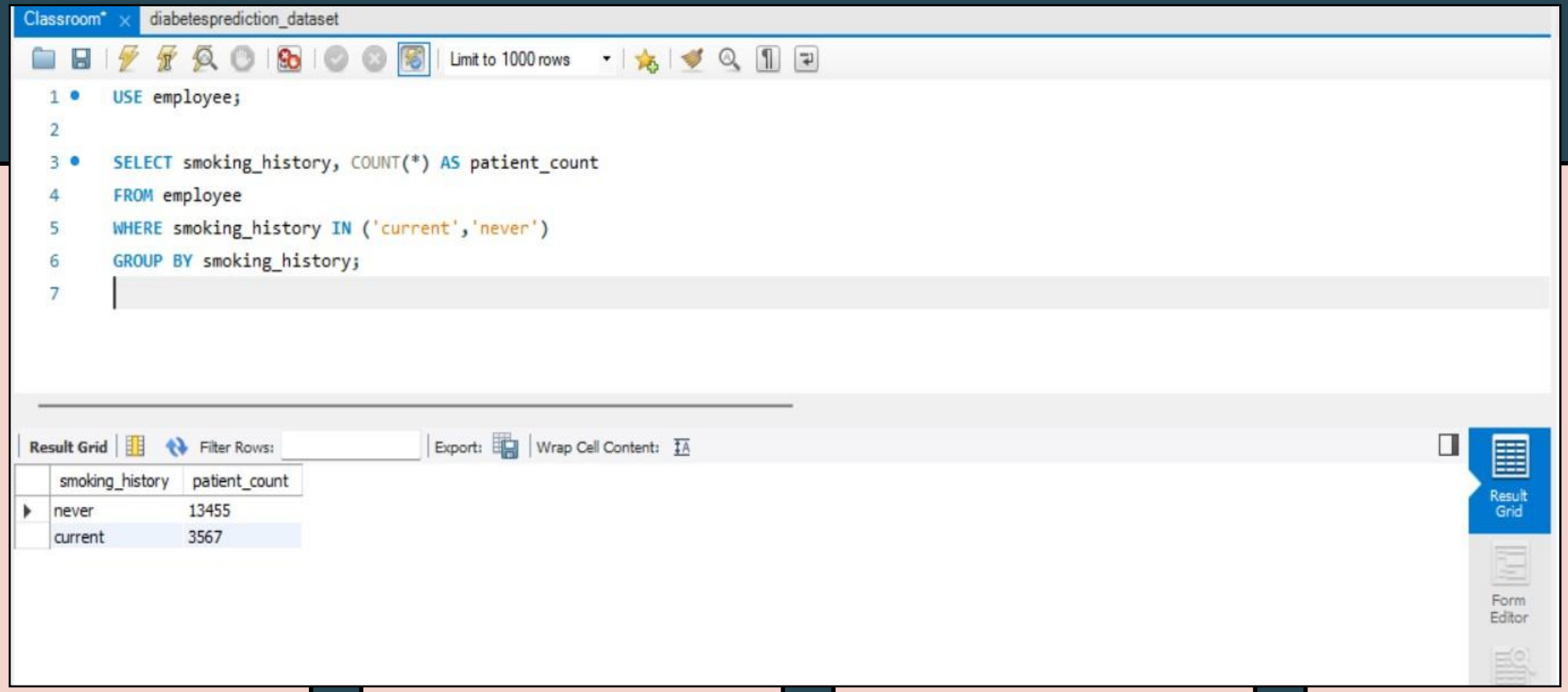


EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
Garreth Miller	PT74437	Female	46	1	0	former	33.78	4.5	155	1
Sheryl Calixta P Ronquillo	PT74478	Female	80	1	0	never	27.32	6.8	280	1
Sheryl Calixta P Ronquillo	PT74478	Female	80	1	0	never	27.32	6.8	280	1
ARTHUR STELLINI	PT343	Male	57	1	1	not current	27.77	6.6	160	1
DEBBIE TAM	PT392	Female	65	1	0	never	38.56	8.8	280	1
JOANNE HOEPER	PT400	Female	63	1	1	not current	42	6.6	160	1
Joseph A Leonardini	PT74658	Female	39	1	0	never	31.11	4.8	159	1
JOHNSON YOU	PT74665	Female	56	1	1	never	32.24	6.8	126	1
DANIEL ARMENTA	PT476	Female	55	1	0	never	29.18	6.8	220	1
Sidney K Sakurai	PT74741	Female	76	1	0	not current	30.43	6.8	280	1
Kevin M Omalley	PT74792	Male	67	1	0	never	26.53	8.8	159	1
JOHN HART	PT565	Male	48	1	0	never	27.32	6	300	1
Triscila F Cael	PT74811	Female	80	1	0	former	27.32	6.5	159	1

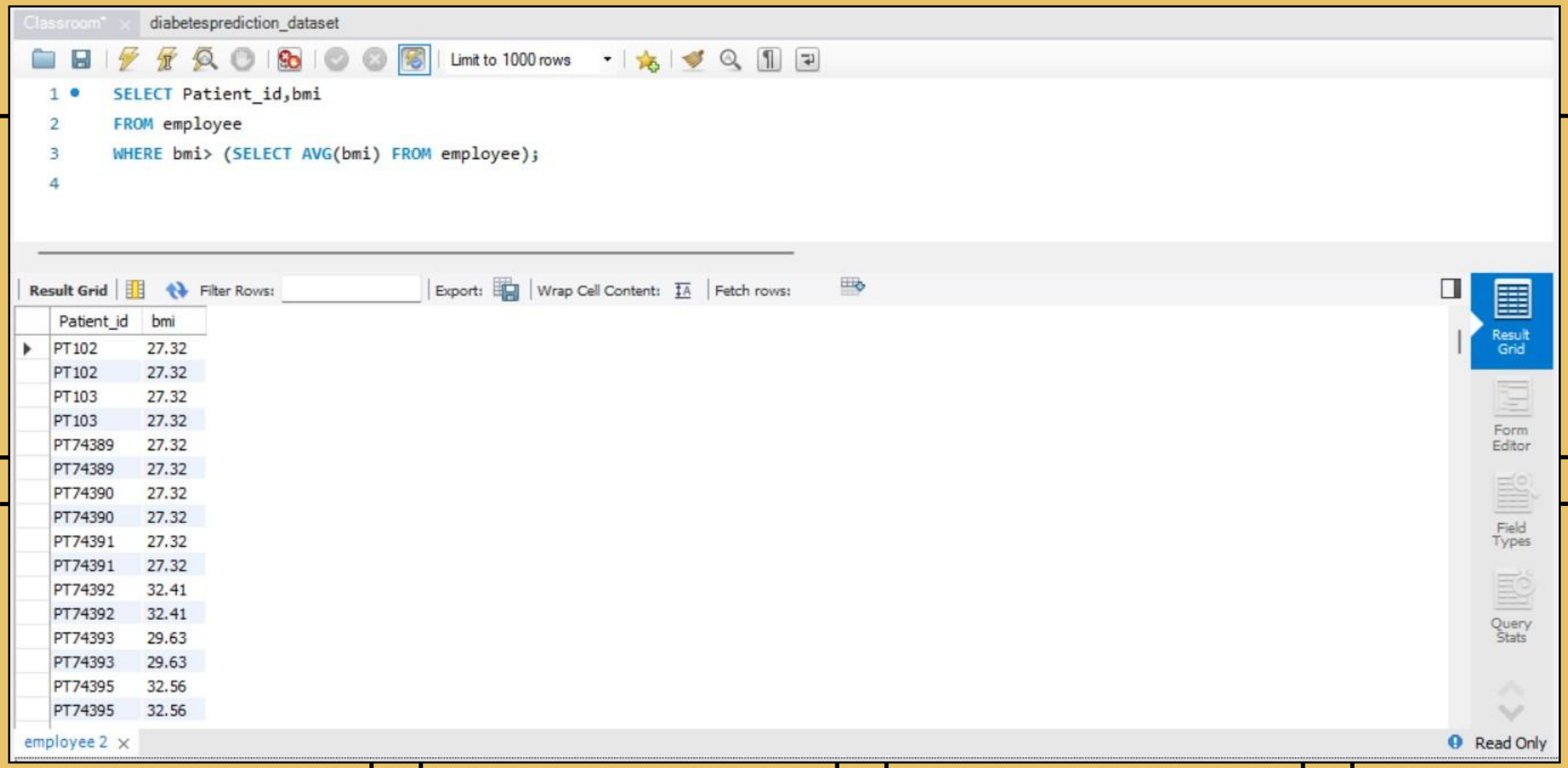
Determine the number of patients with heart disease.



Group patients by smoking history and count how many smokers and nonsmokers there are.



Retrieve the Patient ids of patients who have a BMI greater than the average BMI.



Find the patient with the highest HbA1c level and the patient with the lowest HbA1clevel.

Classroom* | diabetesprediction_dataset

Limit to 1000 rows

```
1  SELECT *
2  FROM employee
3  WHERE HbA1c_level = (SELECT MAX(HbA1c_level) FROM employee)
4     OR HbA1c_level = (SELECT MIN(HbA1c_level) FROM employee);
5
```

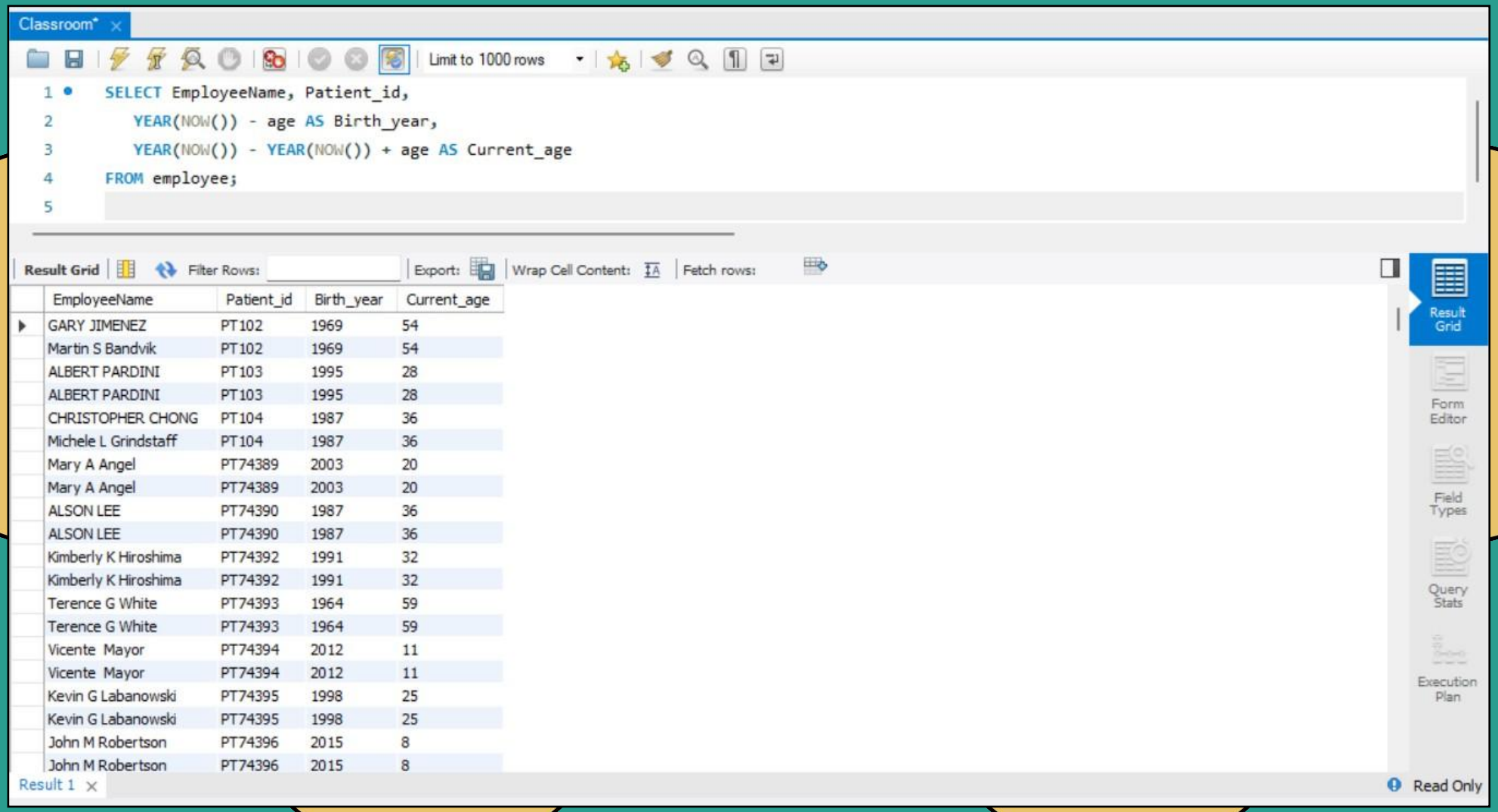
Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
ALSON LEE	PT74390	Female	36	0	0	never	27.32	3.5	100	0
ALSON LEE	PT74390	Female	36	0	0	never	27.32	3.5	100	0
John M Marian	PT74405	Female	67	0	0	No Info	27.32	3.5	130	0
John M Marian	PT74405	Female	67	0	0	No Info	27.32	3.5	130	0
Amen Y Chow	PT74413	Male	44	0	0	never	31.91	3.5	100	0
HARLAN KELLY-JR	PT74413	Male	44	0	0	never	31.91	3.5	100	0
Heather A Piper	PT74433	Female	8	0	0	No Info	21.01	3.5	130	0
KIRK RICHARDSON	PT74433	Female	8	0	0	No Info	21.01	3.5	130	0
Kevin K Chin	PT74435	Male	39	0	0	No Info	27.32	3.5	90	0
MICHAEL ROLOVICH	PT74435	Male	39	0	0	No Info	27.32	3.5	90	0
Tara M Steeley	PT74441	Male	48	1	0	No Info	31.53	3.5	158	0
DOUGLAS RIBA	PT74441	Male	48	1	0	No Info	31.53	3.5	158	0
Kathryn L Miller	PT74442	Female	37	0	0	current	35.93	3.5	159	0
AI-KYUNG CHUNG	PT74442	Female	37	0	0	current	35.93	3.5	159	0
Matthew J Lee	PT74454	Male	43	0	0	not current	27.32	3.5	126	0
Louis W Wong	PT74469	Female	30	0	0	No Info	27.32	3.5	160	0

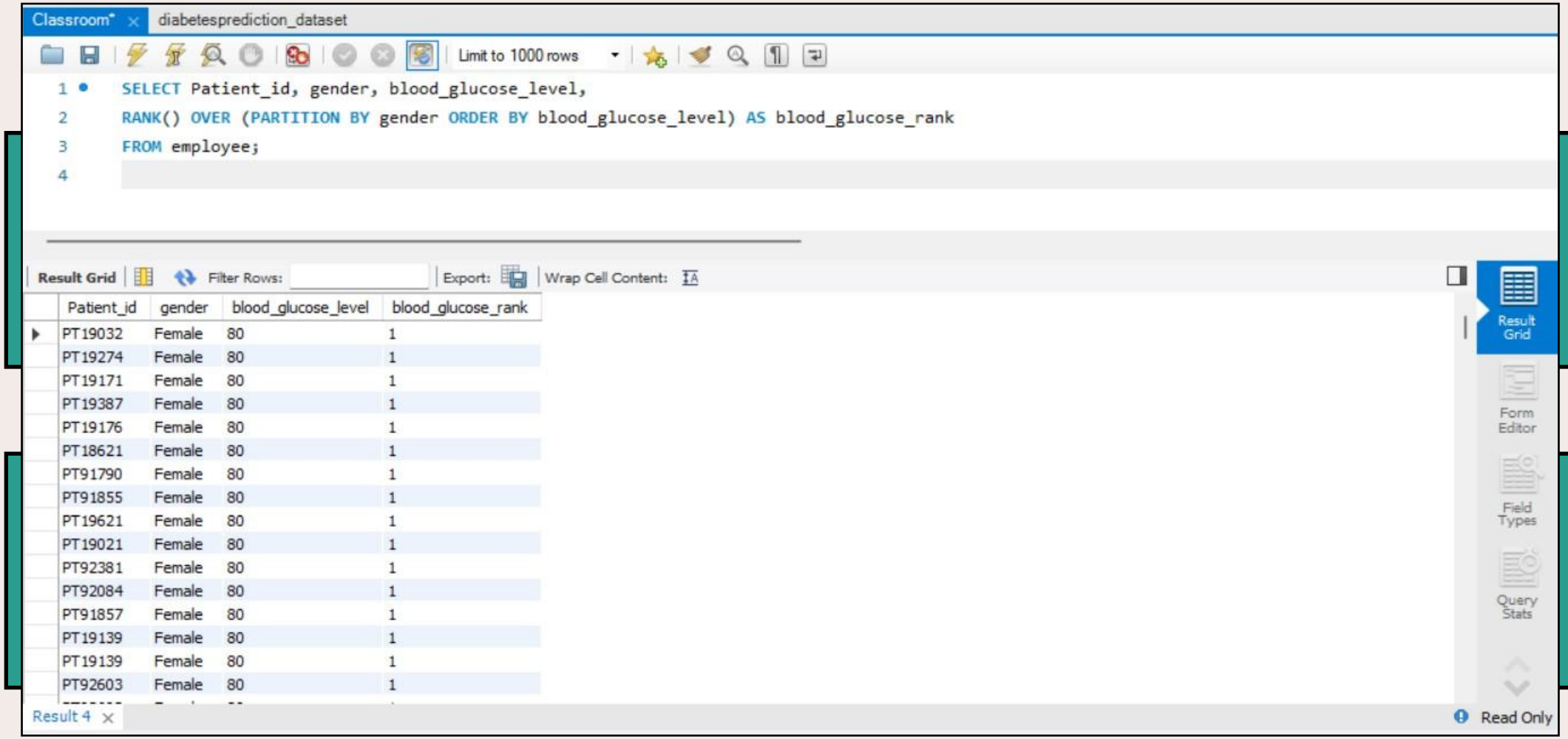
Result Grid | Form Editor | Field Types | Query Stats

employee 3 | Read Only

Calculate the age of patients in years (assuming the current date as of now).



Rank patients by blood glucose level within each gender group.



Patient_id	gender	blood_glucose_level	blood_glucose_rank
PT19032	Female	80	1
PT19274	Female	80	1
PT19171	Female	80	1
PT19387	Female	80	1
PT19176	Female	80	1
PT18621	Female	80	1
PT91790	Female	80	1
PT91855	Female	80	1
PT19621	Female	80	1
PT19021	Female	80	1
PT92381	Female	80	1
PT92084	Female	80	1
PT91857	Female	80	1
PT19139	Female	80	1
PT19139	Female	80	1
PT92603	Female	80	1

Update the smoking history of patients who are older than 50 to "Ex-smoker."

Classroom* | diabetesprediction_dataset

Limit to 1000 rows

```
1  SET SQL_SAFE_UPDATES=0;
2  UPDATE employee
3  SET smoking_history= "Ex-smoke"
4  WHERE age> "50";
5
6  SELECT * FROM employee;
```

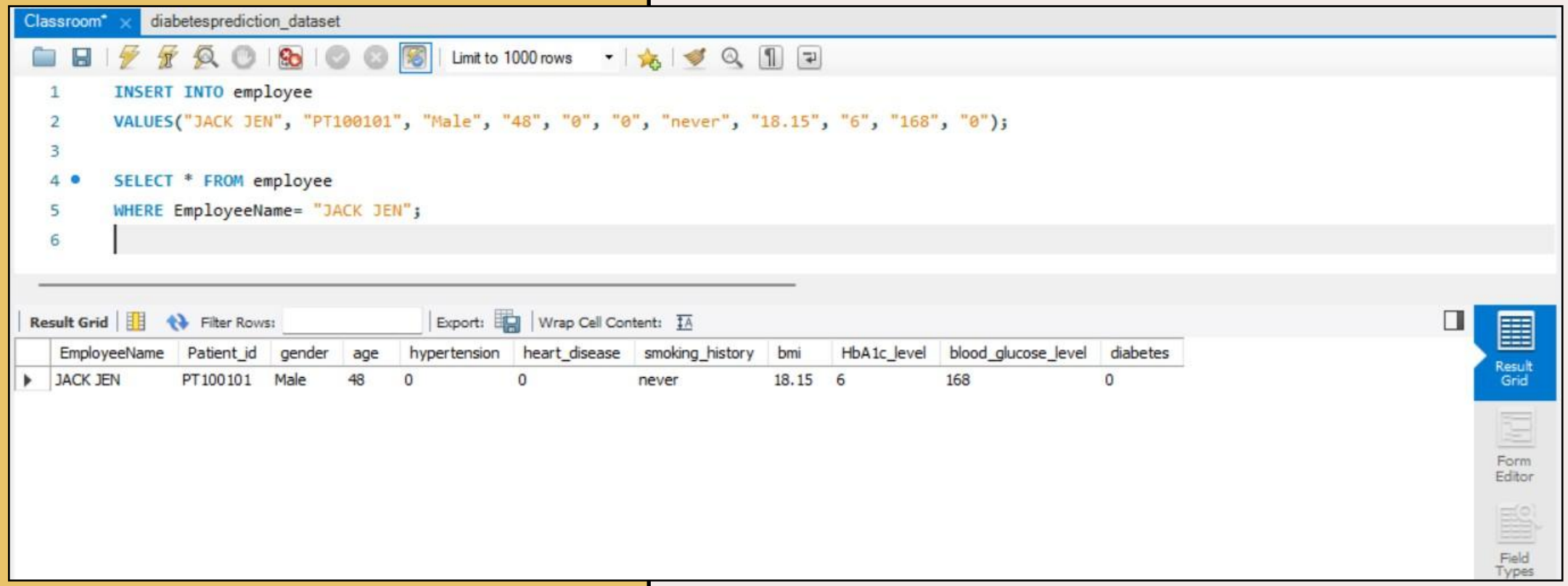
Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
NATHANIEL FORD	PT101	Female	80	0	1	Ex-smoke	25.19	6.6	126	0
Linette Martinez	PT101	Female	80	0	1	Ex-smoke	25.19	6.6	140	0
GARY JIMENEZ	PT102	Female	54	0	0	Ex-smoke	27.32	6.6	80	0
Martin S Bandvik	PT102	Female	54	0	0	Ex-smoke	27.32	6.6	80	0
ALBERT PARDINI	PT103	Male	28	0	0	never	27.32	5.7	158	0
ALBERT PARDINI	PT103	Male	28	0	0	never	27.32	5.7	158	0
CHRISTOPHER CHONG	PT104	Female	36	0	0	current	23.45	5	155	1
Michele L Grindstaff	PT104	Female	36	0	0	current	23.45	5	155	0
PATRICK GARDNER	PT105	Male	76	1	1	Ex-smoke	20.14	4	155	0
PATRICK GARDNER	PT105	Male	76	1	1	Ex-smoke	20.14	4	155	0
Mary A Angel	PT74389	Female	20	0	0	never	27.32	6.6	85	0
Mary A Angel	PT74389	Female	20	0	0	never	27.32	6.6	85	0
ALSON LEE	PT74390	Female	36	0	0	never	27.32	3.5	100	0
ALSON LEE	PT74390	Female	36	0	0	never	27.32	3.5	100	0
John R Torrise	PT74391	Male	80	0	1	Ex-smoke	27.32	5	160	0
John R Torrise	PT74391	Male	80	0	1	Ex-smoke	27.32	5	160	0
Kimberly K Hiroshima	PT74392	Male	32	0	0	not current	32.41	6.5	80	0
Kimberly K Hiroshima	PT74392	Male	32	0	0	not current	32.41	6.5	80	0

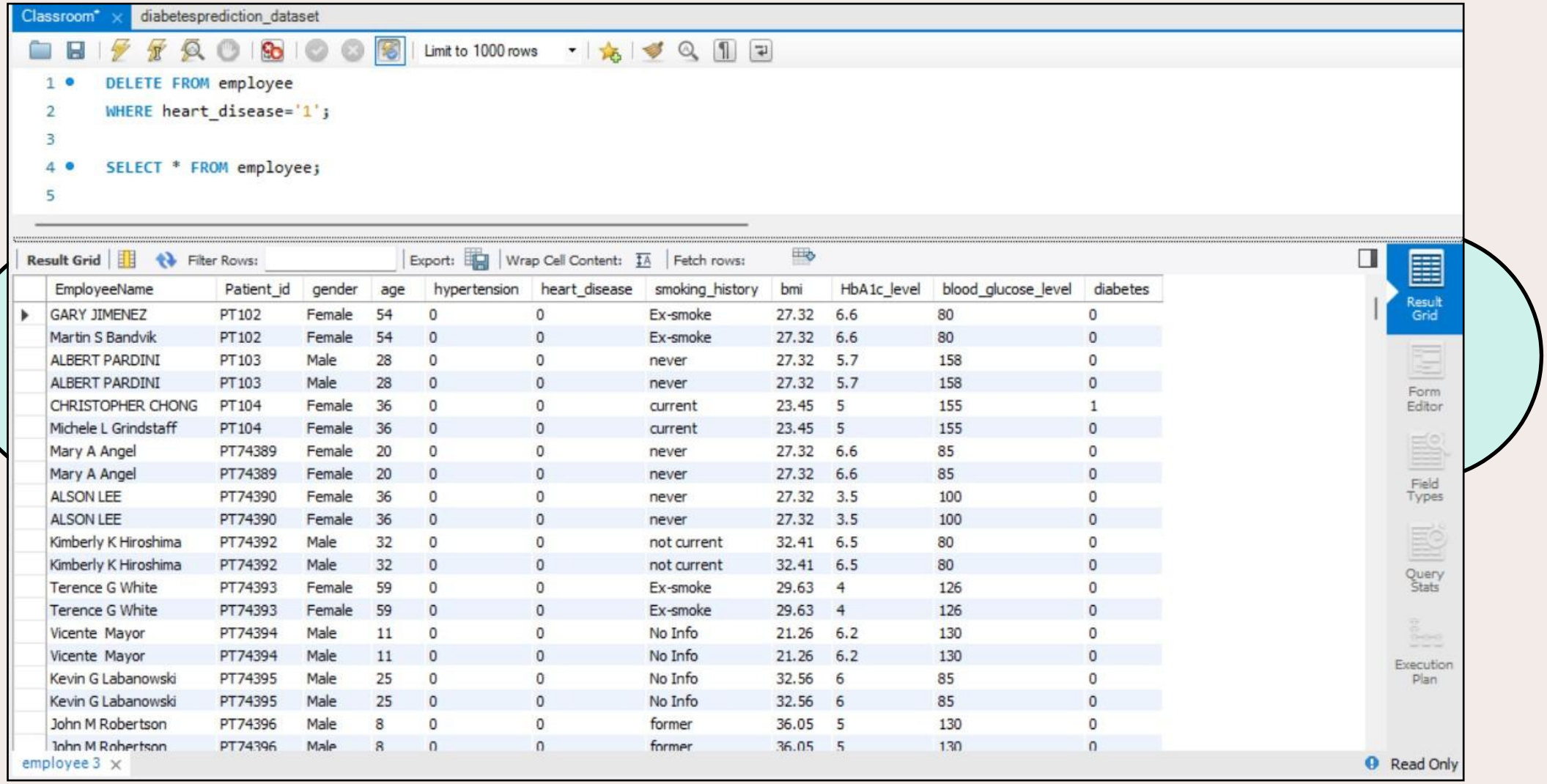
Result Grid | Form Editor | Field Types | Query Stats | Execution Plan

employee 1 | Read Only

Insert a new patient into the database with sample data.



Delete all patients with heart disease from the database.



EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
GARY JIMENEZ	PT102	Female	54	0	0	Ex-smoke	27.32	6.6	80	0
Martin S Bandvik	PT102	Female	54	0	0	Ex-smoke	27.32	6.6	80	0
ALBERT PARDINI	PT103	Male	28	0	0	never	27.32	5.7	158	0
ALBERT PARDINI	PT103	Male	28	0	0	never	27.32	5.7	158	0
CHRISTOPHER CHONG	PT104	Female	36	0	0	current	23.45	5	155	1
Michele L Grindstaff	PT104	Female	36	0	0	current	23.45	5	155	0
Mary A Angel	PT74389	Female	20	0	0	never	27.32	6.6	85	0
Mary A Angel	PT74389	Female	20	0	0	never	27.32	6.6	85	0
ALSON LEE	PT74390	Female	36	0	0	never	27.32	3.5	100	0
ALSON LEE	PT74390	Female	36	0	0	never	27.32	3.5	100	0
Kimberly K Hiroshima	PT74392	Male	32	0	0	not current	32.41	6.5	80	0
Kimberly K Hiroshima	PT74392	Male	32	0	0	not current	32.41	6.5	80	0
Terence G White	PT74393	Female	59	0	0	Ex-smoke	29.63	4	126	0
Terence G White	PT74393	Female	59	0	0	Ex-smoke	29.63	4	126	0
Vicente Mayor	PT74394	Male	11	0	0	No Info	21.26	6.2	130	0
Vicente Mayor	PT74394	Male	11	0	0	No Info	21.26	6.2	130	0
Kevin G Labanowski	PT74395	Male	25	0	0	No Info	32.56	6	85	0
Kevin G Labanowski	PT74395	Male	25	0	0	No Info	32.56	6	85	0
John M Robertson	PT74396	Male	8	0	0	former	36.05	5	130	0
John M Robertson	PT74396	Male	8	0	0	former	36.05	5	130	0

Find patients who have hypertension but not diabetes using the EXCEPT operator.

Classroom* | diabetesprediction_dataset

Limit to 1000 rows

```
1  SELECT * FROM employee
2  WHERE hypertension='1'
3  EXCEPT
4  SELECT * FROM employee
5  WHERE diabetes='1';
6
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

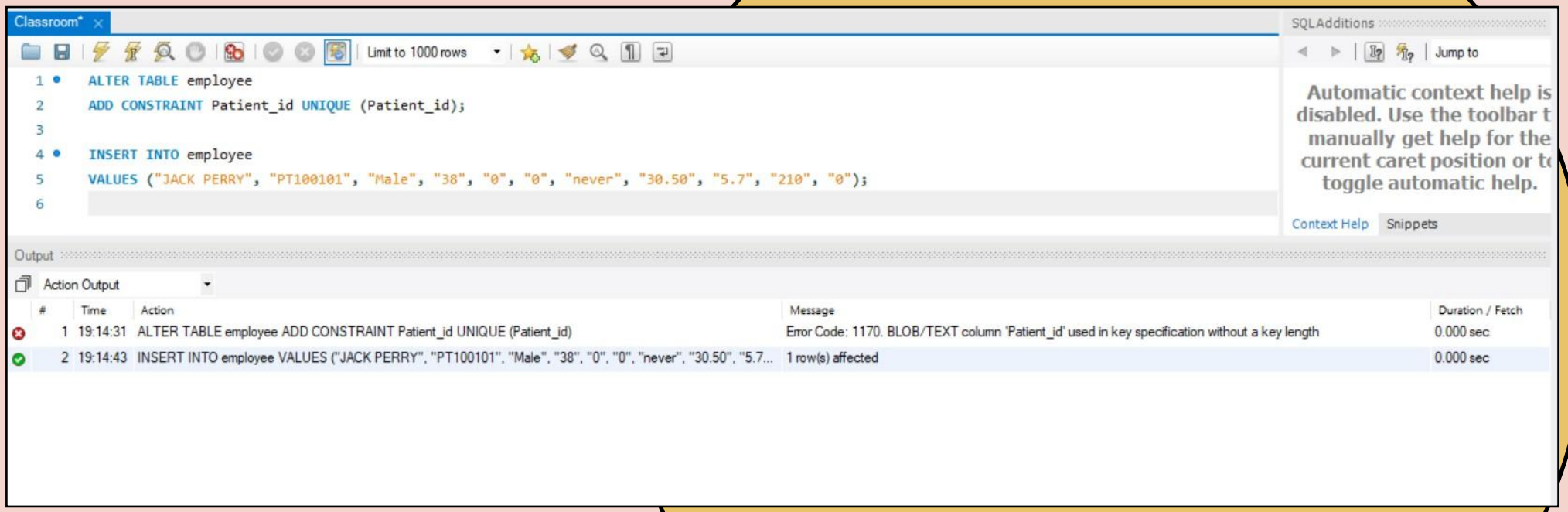
EmployeeName	Patient_id	gender	age	hypertension	heart_disease	smoking_history	bmi	HbA1c_level	blood_glucose_level	diabetes
Charles F Schuler	PT74418	Male	69	1	0	Ex-smoke	32.86	6.6	155	0
KHOA TRINH	PT74418	Male	69	1	0	Ex-smoke	32.86	6.6	155	0
RAY CRAWFORD	PT74437	Female	46	1	0	former	33.78	4.5	155	0
Tara M Steeley	PT74441	Male	48	1	0	No Info	31.53	3.5	158	0
DOUGLAS RIBA	PT74441	Male	48	1	0	No Info	31.53	3.5	158	0
CHARLES SCOTT	PT215	Female	55	1	0	Ex-smoke	34.2	5.7	140	0
SHANNON SAKOWSKI	PT227	Male	79	1	0	Ex-smoke	28.73	6.6	160	0
Karen J Heald	PT227	Male	79	1	0	Ex-smoke	28.73	6.6	160	0
MARISA MORET	PT241	Female	80	1	0	Ex-smoke	44.06	6.5	160	0
William B Griffin	PT241	Female	80	1	0	Ex-smoke	44.06	6.5	160	0
Mark E Mahoney	PT74560	Female	71	1	0	Ex-smoke	24.65	4.5	145	0
Jimmy D Bui	PT74638	Female	40	1	0	current	27.4	5.7	140	0
RAYMOND CHAVEZ	PT380	Male	14	1	0	current	27.32	6.5	126	0
Kevin A Lee	PT74649	Female	65	1	0	Ex-smoke	38.56	8.8	155	0
MORGAN PETITI	PT401	Female	39	1	0	never	31.11	4.8	160	0
Daniel Gray	PT74685	Male	80	1	0	Ex-smoke	20.08	4.8	145	0
MICHAEL GONZALES	PT74685	Male	80	1	0	Ex-smoke	20.08	4.8	145	0
Dustin L Daza	PT74690	Male	62	1	0	Ex-smoke	47.18	5.8	159	0
ROBERT MAERZ	PT74690	Male	62	1	0	Ex-smoke	47.18	5.8	159	0

Result 6

Result Grid | Form Editor | Field Types | Query Stats | Execution Plan

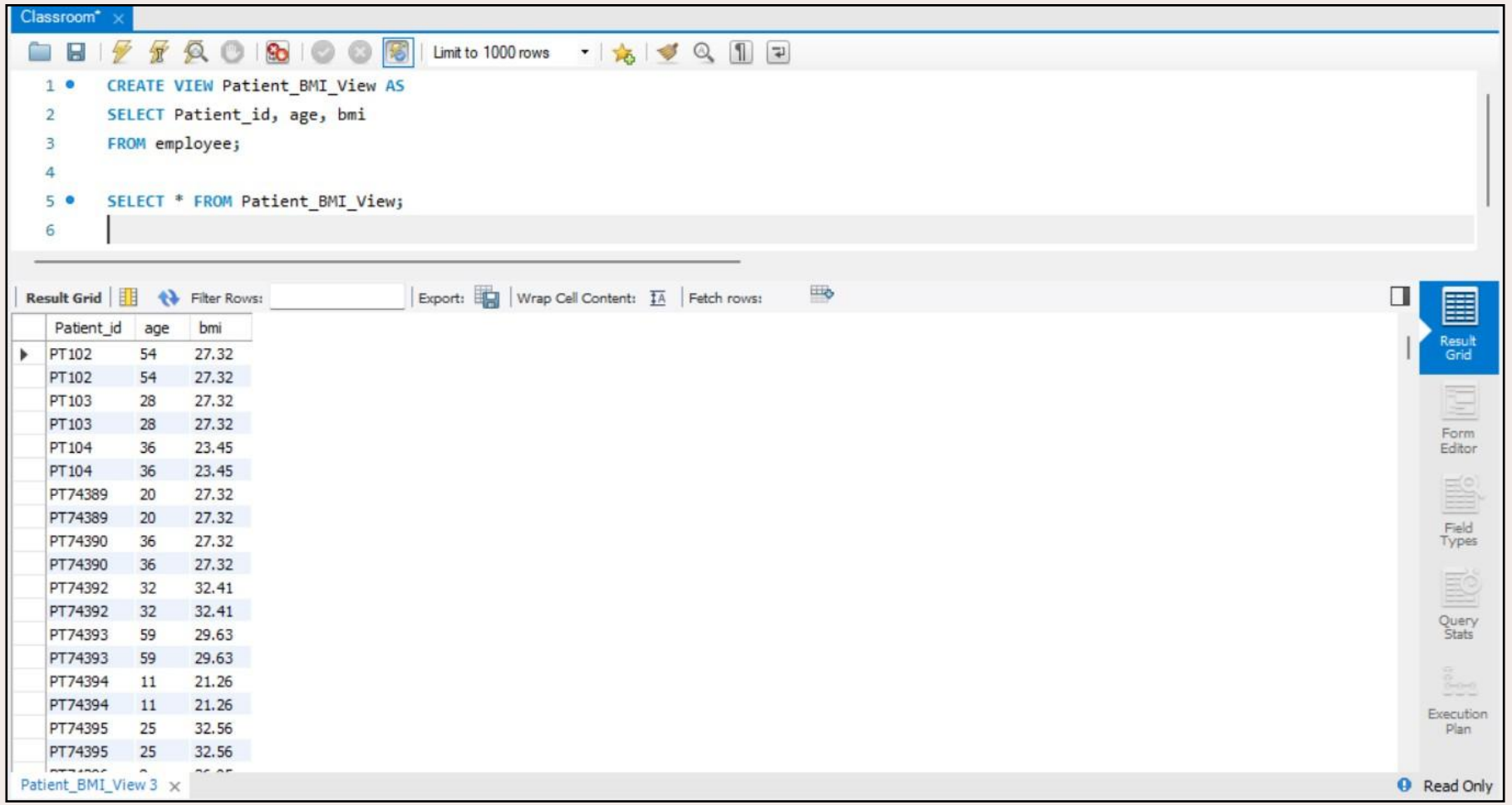
Read Only

Define a unique constraint on the "patient_id" column to ensure its values are unique.



Since, we added a UNIQUE constraint to 'Patient_id', when we insert a duplicate 'Patient_id' it should show an error.

Create a view that displays the Patient_ids, ages, and BMI of patients.



Suggest improvements in the database schema to reduce data redundancy and improve data integrity.

1. Normalization: Break data into smaller tables to reduce redundancy and maintain consistency.
2. Use Foreign Keys: Link tables via keys to avoid duplicate data and enforce referential integrity.
3. Avoid Multi-valued Attributes: Create separate tables for complex attributes to streamline data.
4. Implement Unique Constraints: Ensure uniqueness of critical fields to prevent duplicates.
5. Utilize Indexing: Improve query performance and enforce uniqueness for faster data retrieval.
6. Regular Maintenance: Conduct periodic checks and updates to maintain data consistency.
7. Use Triggers and Constraints: Enforce business rules and maintain data integrity at the database level.
8. Data Validation: Implement checks to ensure accurate data entry and prevent inconsistencies.
9. Utilize Views: Abstract complex queries to enhance data retrieval efficiency and minimize errors.
10. Proper Data Types: Choose appropriate data types to optimize storage and enforce data consistency.

Suggest improvements in the database schema to reduce data redundancy and improve data integrity.

Indexing:
Identify frequently used columns in WHERE clauses and apply indexing to these columns. This helps accelerate query execution by facilitating faster data retrieval.

Query Optimization:
Use proper JOINs, avoid unnecessary SELECT * queries, and employ WHERE clauses efficiently to limit the data processed, thereby reducing query execution time.

Database Statistics Update:
Frequent statistic updates aid query optimizer for accurate query plans based on current data distribution, enhancing performance.

Normalization and Denormalization:
Normalize tables to remove redundancy; denormalize for read-heavy tasks, cutting JOINs to enhance query performance and data retrieval.

Bonus: Consider utilizing stored procedures or views to encapsulate complex queries, optimizing repetitive tasks, and simplifying query execution for better performance.