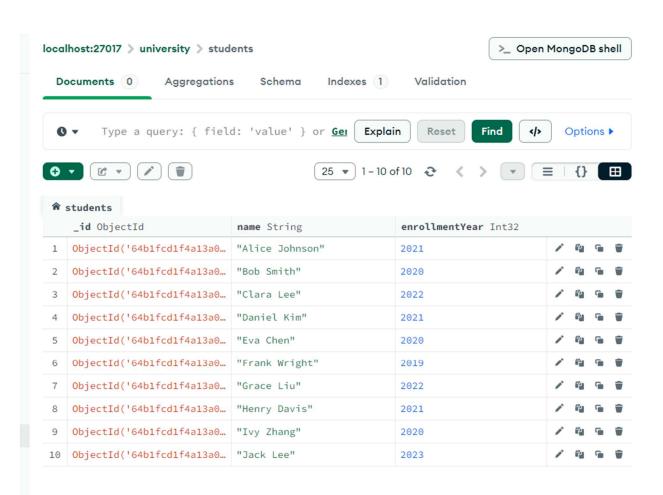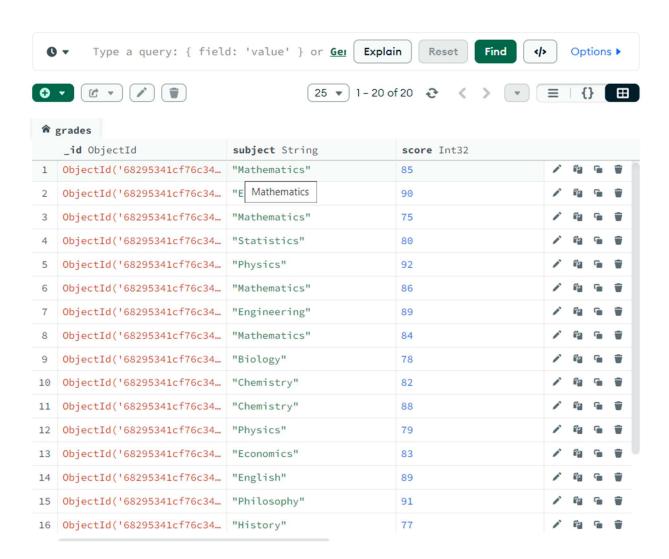1. Create the students and grades collections and insert the sample documents into both collections.

```
>_MONGOSH
      email:   Ivy.zhang@example.com ,
      gender: "Female",
      age: 21
  },
  {
    _id: ObjectId("64b1fcd1f4a13a001e3d41aa"),
    name: "Jack Lee",
    enrollmentYear: 2023,
    major: "Business",
    email: "jack.lee@example.com",
    gender: "Male",
    age: 18
  }])
< {
    acknowledged: true,
    insertedIds: {
      '0': ObjectId('64b1fcd1f4a13a001e3d41a1'),
      '1': ObjectId('64b1fcd1f4a13a001e3d41a2'),
      '2': ObjectId('64b1fcd1f4a13a001e3d41a3'),
      '3': ObjectId('64b1fcd1f4a13a001e3d41a4'),
      '4': ObjectId('64b1fcd1f4a13a001e3d41a5'),
      '5': ObjectId('64b1fcd1f4a13a001e3d41a6'),
      '6': ObjectId('64b1fcd1f4a13a001e3d41a7'),
      '7': ObjectId('64b1fcd1f4a13a001e3d41a8'),
      '8': ObjectId('64b1fcd1f4a13a001e3d41a9'),
      '9': ObjectId('64b1fcd1f4a13a001e3d41aa')
    }
  }
```

```
>_MONGOSH
{ subject: "Business", score: 87, term: "Fall 2023", studentId: ObjectId("64b1fc0
{ subject: "Finance", score: 82, term: "Spring 2024", studentId: ObjectId("64b1fcc
])
< {
    acknowledged: true,
    insertedIds: {
      '0': ObjectId('68295341cf76c34d80212969'),
      '1': ObjectId('68295341cf76c34d8021296a'),
      '2': ObjectId('68295341cf76c34d8021296b'),
      '3': ObjectId('68295341cf76c34d8021296c'),
      '4': ObjectId('68295341cf76c34d8021296d'),
      '5': ObjectId('68295341cf76c34d8021296e'),
      '6': ObjectId('68295341cf76c34d8021296f'),
      '7': ObjectId('68295341cf76c34d80212970'),
      '8': ObjectId('68295341cf76c34d80212971'),
      '9': ObjectId('68295341cf76c34d80212972'),
      '10': ObjectId('68295341cf76c34d80212973'),
      '11': ObjectId('68295341cf76c34d80212974'),
      '12': ObjectId('68295341cf76c34d80212975'),
      '13': ObjectId('68295341cf76c34d80212976'),
      '14': ObjectId('68295341cf76c34d80212977'),
      '15': ObjectId('68295341cf76c34d80212978'),
      '16': ObjectId('68295341cf76c34d80212979'),
      '17': ObjectId('68295341cf76c34d8021297a'),
      '18': ObjectId('68295341cf76c34d8021297b'),
      '19': ObjectId('68295341cf76c34d8021297c')
    }
}
```

2. Show both collections in table view.

>_ Open MongoDB shell

Documents 0   Aggregations   Schema   Indexes 1   Validation

🕐 ▾   Type a query: { field: 'value' } or Ge⌐   Explain   Reset   **Find**   </>   Options ▸

➕ ▾   ☒ ▾   ✎   🗑   25 ▾   1 – 10 of 10   ↻   ‹   ›   ▾   ☰ | {} | ⊞

🏠 **students**

	_id ObjectId	**name** String	**enrollmentYear** Int32	
1	ObjectId('64b1fcd1f4a13a0…	"Alice Johnson"	2021	✎ 🗐 🗐 🗑
2	ObjectId('64b1fcd1f4a13a0…	"Bob Smith"	2020	✎ 🗐 🗐 🗑
3	ObjectId('64b1fcd1f4a13a0…	"Clara Lee"	2022	✎ 🗐 🗐 🗑
4	ObjectId('64b1fcd1f4a13a0…	"Daniel Kim"	2021	✎ 🗐 🗐 🗑
5	ObjectId('64b1fcd1f4a13a0…	"Eva Chen"	2020	✎ 🗐 🗐 🗑
6	ObjectId('64b1fcd1f4a13a0…	"Frank Wright"	2019	✎ 🗐 🗐 🗑
7	ObjectId('64b1fcd1f4a13a0…	"Grace Liu"	2022	✎ 🗐 🗐 🗑
8	ObjectId('64b1fcd1f4a13a0…	"Henry Davis"	2021	✎ 🗐 🗐 🗑
9	ObjectId('64b1fcd1f4a13a0…	"Ivy Zhang"	2020	✎ 🗐 🗐 🗑
10	ObjectId('64b1fcd1f4a13a0…	"Jack Lee"	2023	✎ 🗐 🗐 🗑

25 ▼ 1 – 20 of 20

🏠 grades

	_id ObjectId	subject String	score Int32	
1	ObjectId('68295341cf76c34...	"Mathematics"	85	✎ 🗐 🗇 🗑
2	ObjectId('68295341cf76c34...	"E| Mathematics	90	✎ 🗐 🗇 🗑
3	ObjectId('68295341cf76c34...	"Mathematics"	75	✎ 🗐 🗇 🗑
4	ObjectId('68295341cf76c34...	"Statistics"	80	✎ 🗐 🗇 🗑
5	ObjectId('68295341cf76c34...	"Physics"	92	✎ 🗐 🗇 🗑
6	ObjectId('68295341cf76c34...	"Mathematics"	86	✎ 🗐 🗇 🗑
7	ObjectId('68295341cf76c34...	"Engineering"	89	✎ 🗐 🗇 🗑
8	ObjectId('68295341cf76c34...	"Mathematics"	84	✎ 🗐 🗇 🗑
9	ObjectId('68295341cf76c34...	"Biology"	78	✎ 🗐 🗇 🗑
10	ObjectId('68295341cf76c34...	"Chemistry"	82	✎ 🗐 🗇 🗑
11	ObjectId('68295341cf76c34...	"Chemistry"	88	✎ 🗐 🗇 🗑
12	ObjectId('68295341cf76c34...	"Physics"	79	✎ 🗐 🗇 🗑
13	ObjectId('68295341cf76c34...	"Economics"	83	✎ 🗐 🗇 🗑
14	ObjectId('68295341cf76c34...	"English"	89	✎ 🗐 🗇 🗑
15	ObjectId('68295341cf76c34...	"Philosophy"	91	✎ 🗐 🗇 🗑
16	ObjectId('68295341cf76c34...	"History"	77	✎ 🗐 🗇 🗑

3. Find the female students and only display their name, age and gender.

```
>_MONGOSH

> db.students.find({gender:"Female"},
  {_id:0,name:1,age:1,gender:1})
< {
    name: 'Alice Johnson',
    gender: 'Female',
    age: 20
  }
  {
    name: 'Clara Lee',
    gender: 'Female',
    age: 19
  }
  {
    name: 'Eva Chen',
    gender: 'Female',
    age: 23
  }
  {
    name: 'Grace Liu',
    gender: 'Female',
    age: 20
  }
  {
    name: 'Ivy Zhang',
    gender: 'Female',
    age: 21
  }
```

4. Find the students who are younger than 22 and enrolled after 2020.

```
> db.students.find(
  {age:{$lt:22},
  enrollmentYear:{$gt:2020}})
< {
    _id: ObjectId('64b1fcd1f4a13a001e3d41a1'),
    name: 'Alice Johnson',
    enrollmentYear: 2021,
    major: 'Computer Science',
    email: 'alice.johnson@example.com',
    gender: 'Female',
    age: 20
  }
  {
    _id: ObjectId('64b1fcd1f4a13a001e3d41a3'),
    name: 'Clara Lee',
    enrollmentYear: 2022,
    major: 'Physics',
    email: 'clara.lee@example.com',
    gender: 'Female',
    age: 19
  }
  {
    _id: ObjectId('64b1fcd1f4a13a001e3d41a4'),
    name: 'Daniel Kim',
    enrollmentYear: 2021,
    major: 'Engineering',
    email: 'daniel.kim@example.com',
    gender: 'Male',
```

```
>_MONGOSH

  {
    _id: ObjectId('64b1fcd1f4a13a001e3d41a4'),
    name: 'Daniel Kim',
    enrollmentYear: 2021,
    major: 'Engineering',
    email: 'daniel.kim@example.com',
    gender: 'Male',
    age: 21
  }
  {
    _id: ObjectId('64b1fcd1f4a13a001e3d41a7'),
    name: 'Grace Liu',
    enrollmentYear: 2022,
    major: 'Economics',
    email: 'grace.liu@example.com',
    gender: 'Female',
    age: 20
  }
  {
    _id: ObjectId('64b1fcd1f4a13a001e3d41aa'),
    name: 'Jack Lee',
    enrollmentYear: 2023,
    major: 'Business',
    email: 'jack.lee@example.com',
    gender: 'Male',
    age: 18
  }
university >
```

5. Find all grades for "Alice Johnson".

```
> const aliceId =db.students.findOne({name :"Alice Johnson"})._id;
  db.grades.find({studentId: aliceId});
{
    _id: ObjectId('68295341cf76c34d80212969'),
    subject: 'Mathematics',
    score: 85,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a1')
}
{
    _id: ObjectId('68295341cf76c34d8021296a'),
    subject: 'English',
    score: 90,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a1')
}
```

6. Find how many students followed the subject "Mathematics".

```
> db.grades.distinct("studentId", {subject:"Mathematics"}).length;
  4
```

7. Find all students with grades in the term "Fall 2022".

```
>_MONGOSH

> db.grades.find(
  {term:"Fall 2022"})
< {
    _id: ObjectId('68295341cf76c34d80212969'),
    subject: 'Mathematics',
    score: 85,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a1')
  }
  {
    _id: ObjectId('68295341cf76c34d8021296a'),
    subject: 'English',
    score: 90,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a1')
  }
  {
    _id: ObjectId('68295341cf76c34d8021296c'),
    subject: 'Statistics',
    score: 80,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a2')
  }
  {
    _id: ObjectId('68295341cf76c34d8021296d'),
    subject: 'Physics',
    score: 92,
    term: 'Fall 2022',
```