Задние 2

1. Какова разница между максимальной и минимальной температурой в течение года?

```
weather> db.forecasts.aggregate([
...   {
...     $group: {
...       _id: null,
...       maxTemp: { $max: "$temperature" },
...       minTemp: { $min: "$temperature" }
...     }
...   },
...   {
...     $project: {
...       _id: 0,
...       maxTemp: 1,
...       minTemp: 1,
...       temperatureDifference: { $subtract: ["$maxTemp", "$minTemp"] }
...     }
...   }
... ])
[ { maxTemp: 34.8, minTemp: -22.6, temperatureDifference: 57.4 } ]
```

2. Какова средняя температура в году, если исключить 10 дней с самой низкой температурой и 10 дней с самой высокой?

```
weather> db.forecasts.aggregate([
...   {
...     $group: {
...       _id: { year: "$year", month: "$month", day: "$day" },
...       dailyAvgTemp: { $avg: "$temperature" }
...     }
...   },
...
...   { $sort: { dailyAvgTemp: 1 } },
...   { $skip: 10 },
...   { $sort: { dailyAvgTemp: -1 } },
...   { $skip: 10 },
...
...   {
...     $group: {
...       _id: null,
...       avgTempWithoutExtremes: { $avg: "$dailyAvgTemp" }
...     }
...   },
...
...   {
...     $project: {
...       _id: 0,
...         averageTemperatureExcludingExtremes: {
...         $round: ["$avgTempWithoutExtremes", 1]
...       }
...     }
...   }
... ])
[ { averageTemperatureExcludingExtremes: 8 } ]
```

3. Найти первые 10 записей с самой низкой погодой, когда дул ветер с юга и посчитайте среднюю температуры для этих записей

```
weather> db.forecasts.aggregate([
...   { $match: { wind_direction: "Южный" } },
...   { $sort: { temperature: 1 } },
...   { $limit: 10 },
...   {
...     $group: {
...       _id: null,
...       avg_temperature: { $avg: "$temperature" },
...       records: { $push: "$$ROOT" }
...     }
...   }
... ])
```

```
avg_temperature: -12.95,
records: [
  {
    _id: ObjectId('694a97939f6f0f58c416caa8'),
    year: 2014,
    month: 1,
    day: 31,
    hour: 9,
    temperature: -18,
    wind_direction: 'Южный',
    wind: '4',
    code: 'CL',
    clouds: 7,
    visibility: 10,
    humidity: 60,
    pressure: 1015
  },
  {
    _id: ObjectId('694a97939f6f0f58c416caa9'),
    year: 2014,
    month: 1,
    day: 31,
    hour: 12,
    temperature: -14.7,
    wind_direction: 'Южный',
    wind: '4',
    code: 'CL',
    clouds: 7,
    visibility: 10,
    humidity: 55,
    pressure: 1045
  },
```

```
{
  _id: ObjectId('694a97939f6f0f58c416caab'),
  year: 2014,
  month: 1,
  day: 31,
  hour: 18,
  temperature: -13.9,
  wind_direction: 'Южный',
  wind: '4',
  code: 'CL',
  clouds: 6,
  visibility: 10,
  humidity: 55,
  pressure: 1043
},
{
  _id: ObjectId('694a97939f6f0f58c416caad'),
  year: 2014,
  month: 2,
  day: 1,
  hour: 0,
  temperature: -13.5,
  wind_direction: 'Южный',
  wind: '5',
  code: 'CL',
  clouds: 9,
  visibility: 10,
  humidity: 60,
  pressure: 1040
},
```

```
{
  _id: ObjectId('694a97939f6f0f58c416caaf'),
  year: 2014,
  month: 2,
  day: 1,
  hour: 6,
  temperature: -13.3,
  wind_direction: 'Южный',
  wind: '4',
  code: 'CL',
  clouds: 7,
  visibility: 10,
  humidity: 55,
  pressure: 1038
},
{
  _id: ObjectId('694a97939f6f0f58c416d42a'),
  year: 2014,
  month: 12,
  day: 3,
  hour: 6,
  temperature: -12.4,
  wind_direction: 'Южный',
  wind: '2',
  code: 'BR',
  clouds: 1,
  visibility: 6,
  humidity: 90,
  pressure: 1033
},
```

```
{
  _id: ObjectId('694a97939f6f0f58c416cab0'),
  year: 2014,
  month: 2,
  day: 1,
  hour: 9,
  temperature: -11.7,
  wind_direction: 'Южный',
  wind: '6',
  code: 'CL',
  clouds: 9,
  visibility: 10,
  humidity: 55,
  pressure: 1037
},
{
  _id: ObjectId('694a97939f6f0f58c416cabe'),
  year: 2014,
  month: 2,
  day: 3,
  hour: 3,
  temperature: -10.8,
  wind_direction: 'Южный',
  wind: '3',
  code: 'SN',
  clouds: 9,
  visibility: 10,
  humidity: 95,
  pressure: 1031
},
```

```
{
  _id: ObjectId('694a97939f6f0f58c416cab4'),
  year: 2014,
  month: 2,
  day: 1,
  hour: 21,
  temperature: -10.7,
  wind_direction: 'Южный',
  wind: '6',
  code: 'CL',
  clouds: 6,
  visibility: 10,
  humidity: 55,
  pressure: 1033
},
{
  _id: ObjectId('694a97939f6f0f58c416cab3'),
  year: 2014,
  month: 2,
  day: 1,
  hour: 18,
  temperature: -10.5,
  wind_direction: 'Южный',
  wind: '6',
  code: 'CL',
  clouds: 0,
  visibility: 10,
  humidity: 55,
  pressure: 1034
}
```

4. Подсчитайте количество дней, когда шел снег. (Будем считать снегом осадки, которые выпали, когда температура была ниже нуля)

```
weather> db.forecasts.aggregate([
...   {
...     $match: {
...       temperature: { $lt: 0 },
...     }
...   },
...   {
...     $group: {
...       _id: {
...         year: "$year",
...         month: "$month",
...         day: "$day"
...       }
...     }
...   },
...   {
...     $count: "snow_days_count"
...   }
... ])
[ { snow_days_count: 101 } ]
```

5. В течение зимы иногда шел снег, а иногда дождь. Насколько больше (или меньше) выпало осадков в виде снега.

```
weather> db.forecasts.aggregate([
...   {
...     $match: {
...       month: { $in: [12, 1, 2] },
...       code: { $in: ["SN", "RA"] }
...     }
...   },
...   {
...     $group: {
...       _id: null,
...       snowDays: {
...         $sum: { $cond: [{ $eq: ["$code", "SN"] }, 1, 0] }
...       },
...       rainDays: {
...         $sum: { $cond: [{ $eq: ["$code", "RA"] }, 1, 0] }
...       }
...     }
...   },
...   {
...     $project: {
...       _id: 0,
...       snowDays: 1,
...       rainDays: 1,
...       difference: { $subtract: ["$snowDays", "$rainDays"] }
...     }
...   }
... ])
[ { snowDays: 67, rainDays: 57, difference: 10 } ]
```

6. Какова вероятность того что в ясный день выпадут осадки? (Предположим, что день считается ясным, если ясная погода фиксируется более чем в 75% случаев)

```
weather> db.forecasts.aggregate([
...   {
...     $group: {
...       _id: {
...         year: "$year",
...         month: "$month",
...         day: "$day"
...       },
...       totalHours: { $sum: 1 },
...       clearHours: { $sum: { $cond: [{ $lt: ["$clouds", 7] }, 1, 0] } },
...       hadPrecip: {
...         $max: {
...           $cond: [
...             { $in: ["$code", ["RA", "SN", "SHRA", "TS", "BR"]] },
...             1,
...             0
...           ]
...         }
...       }
...     }
...   },
...   {
...     $match: {
...       $expr: { $gt: [{ $divide: ["$clearHours", "$totalHours"] }, 0.75] }
...     }
...   },
...   {
...     $group: {
...       _id: null,
...       totalClearDays: { $sum: 1 },
...       clearDaysWithPrecip: { $sum: "$hadPrecip" }
...     }
...   },
...   {
...     $project: {
...       _id: 0,
...       probability: {
...         $round: [
...           {
...             $multiply: [
...               { $divide: ["$clearDaysWithPrecip", "$totalClearDays"] },
...               100
...             ]
...           },
...           2
...         ]
...       }
...     }
...   }
... ])
[ { probability: 17.65 } ]
```

7. Увеличьте температуру на один градус при каждом измерении в нечетный день во время зимы. На сколько градусов изменилась средняя температура?

```
weather> db.forecasts.aggregate([
...   {
...     $match: {
...       month: { $in: [12, 1, 2] }
...     }
...   },
...   {
...     $group: {
...       _id: null,
...       originalAvgTemp: { $avg: "$temperature" },
...       adjustedAvgTemp: {
...         $avg: {
...           $cond: [
...             { $eq: [{ $mod: ["$day", 2] }, 1] },
...             { $add: ["$temperature", 1] },
...             "$temperature"
...           ]
...         }
...       }
...     }
...   },
...   {
...     $project: {
...       _id: 0,
...       originalAvgTemp: { $round: ["$originalAvgTemp", 2] },
...       adjustedAvgTemp: { $round: ["$adjustedAvgTemp", 2] },
...       difference: {
...         $round: [
...           { $subtract: ["$adjustedAvgTemp", "$originalAvgTemp"] },
...           2
...         ]
...       }
...     }
...   }
... ])
[
  { originalAvgTemp: -3.73, adjustedAvgTemp: -3.21, difference: 0.51 }
```