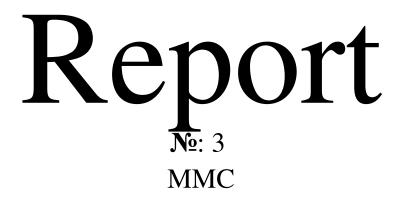
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1 Fixed point

```
[fixed_point_finder] f1: x = 0.85261 | x - f(x) | = 0.00000; iterations = 102 [aitken_extrapolation] f1: x = 0.85261 | x - f(x) | = 0.00000; iterations = 4 [fixed_point_finder] f2: x = 0.71419 | x - f(x) | = 0.00000; iterations = 83 [aitken_extrapolation] f2: x = 0.71419 | x - f(x) | = 0.00000; iterations = 4 [fixed_point_finder] f3: x = 6.01550 | x - f(x) | = 0.00000; iterations = 300 [aitken_extrapolation] f3: x = 6.01550 | x - f(x) | = 0.00000; iterations = 4 Result 1: Fixed point iteration and Aitken method
```

It can be clearly seen that Aitken extrapolation converges much faster (by the number of iterations). This algorithm is used to accelerate the rate of convergence of a sequence.

Algorithm 1: fixed_point_finder()

```
x = x0;
while |x - f(x)| > tolerance:
x = f(x);
return x;
```

Algorithm 2: aitken_extrapolation()

```
1 x1, x2, x3 = x0, x0, x0

2 do

4 {

5 x0 = x1;

6 x1 = f(x0);

7 x2 = f(x1);

8 \lambda = (x2 - x1) / (x1 - x0);

9 x3 = x2 + \frac{\lambda}{1-\lambda}(x2-x1);

10 x1 = x3;

11 } while |x3 - x2| < \text{tolerance};

12 return x1;
```

Fixed point python code

2 Banking

```
Years to pay off the loan: 16
You must pay 8718.46 per year to pay off the loan in 20 year
Yearly rate must be 7.75% to pay off the loan in 20 years

Result 2: Banking results
```

For this exercise, Newton method was used.

Knowing the at least the basics of numerical analysis, we can solve diverse problems, that seem to be a bit complicated at first.

Banking python code