Лабораторная работа 8
Конкуренция двух фирм

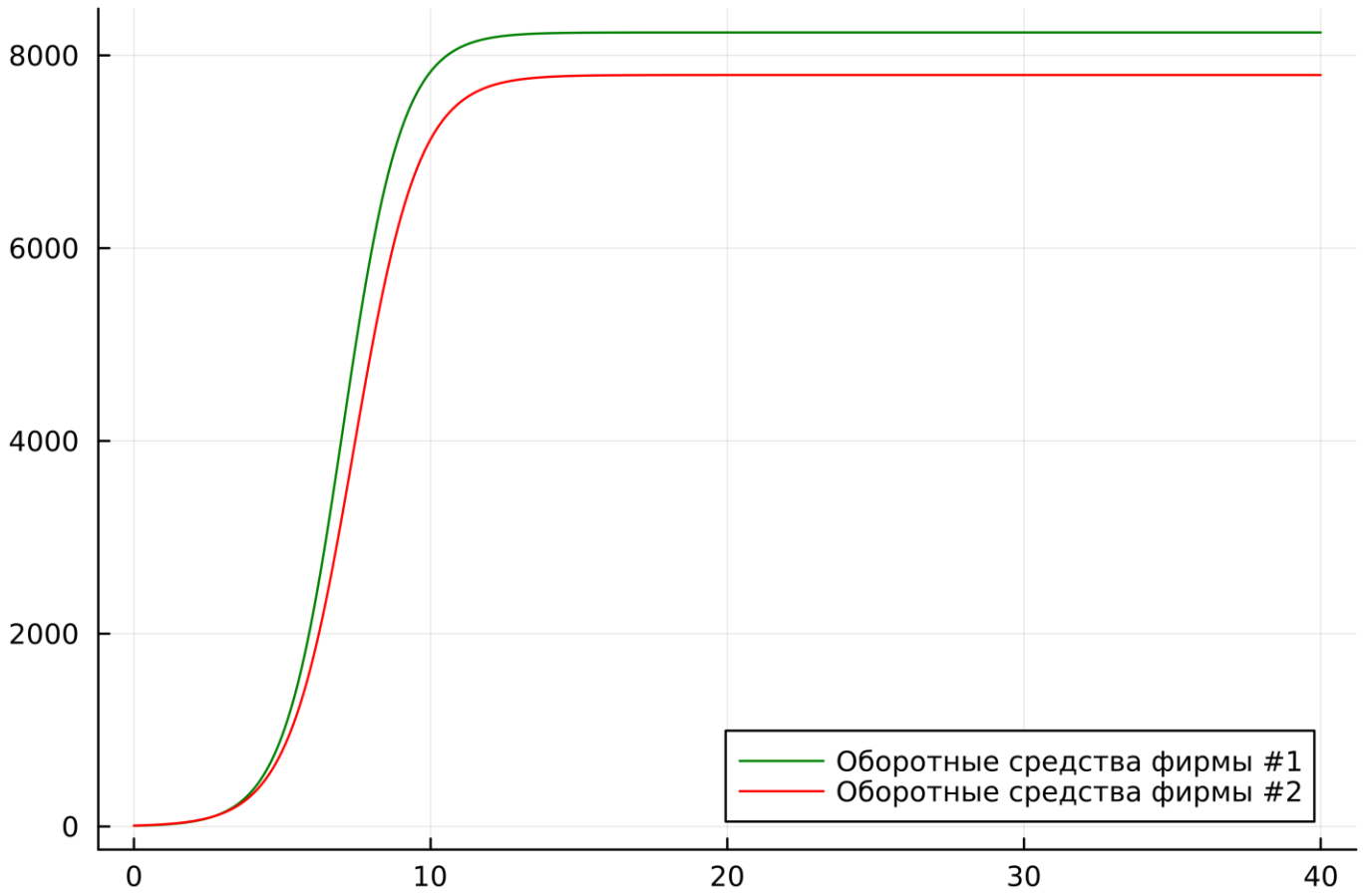
Выполнил: Петрушов Дмитрий Сергеевич

№ студ. Билета: 1032212287

1 задача

```
using Plots
using DifferentialEquations

kr = 42
t1 = 28
p1 = 8.1
t2 = 22
p2 = 10.5
N = 45
q = 1

a1 = kr / (t1 * t1 * p1 * p1 * N * q)
a2 = kr / (t2 * t2 * p2 * p2 * N *q)
b = kr / (t1 * t1 * t2 * t2 * p1 * p1 * p2 * p2 * N * q)
c1 = (kr - p1) / (t1 * p1)
c2 = (kr - p2) / (t2 * p2)


function ode_fn(du, u, p, t)
    M1, M2 = u
    du[1] = u[1] - b / c1*u[1] * u[2] - a1 / c1*u[1] * u[1]
    du[2] = c2 / c1*u[2] - b / c1*u[1] * u[2] - a2 / c1*u[2] * u[2]
end

v0 = [7.2, 9.1]
tspan = (0.0, 40.0)
prob = ODEProblem(ode_fn, v0, tspan)
sol = solve(prob, dtmax = 0.05)
M1 = [u[1] for u in sol.u]
M2 = [u[2] for u in sol.u]
T = [t for t in sol.t]

plt = plot(
  dpi = 600,
  legend = true)

plot!(plt, T, M1, label = "Оборотные средства фирмы #1", color = :green)
```

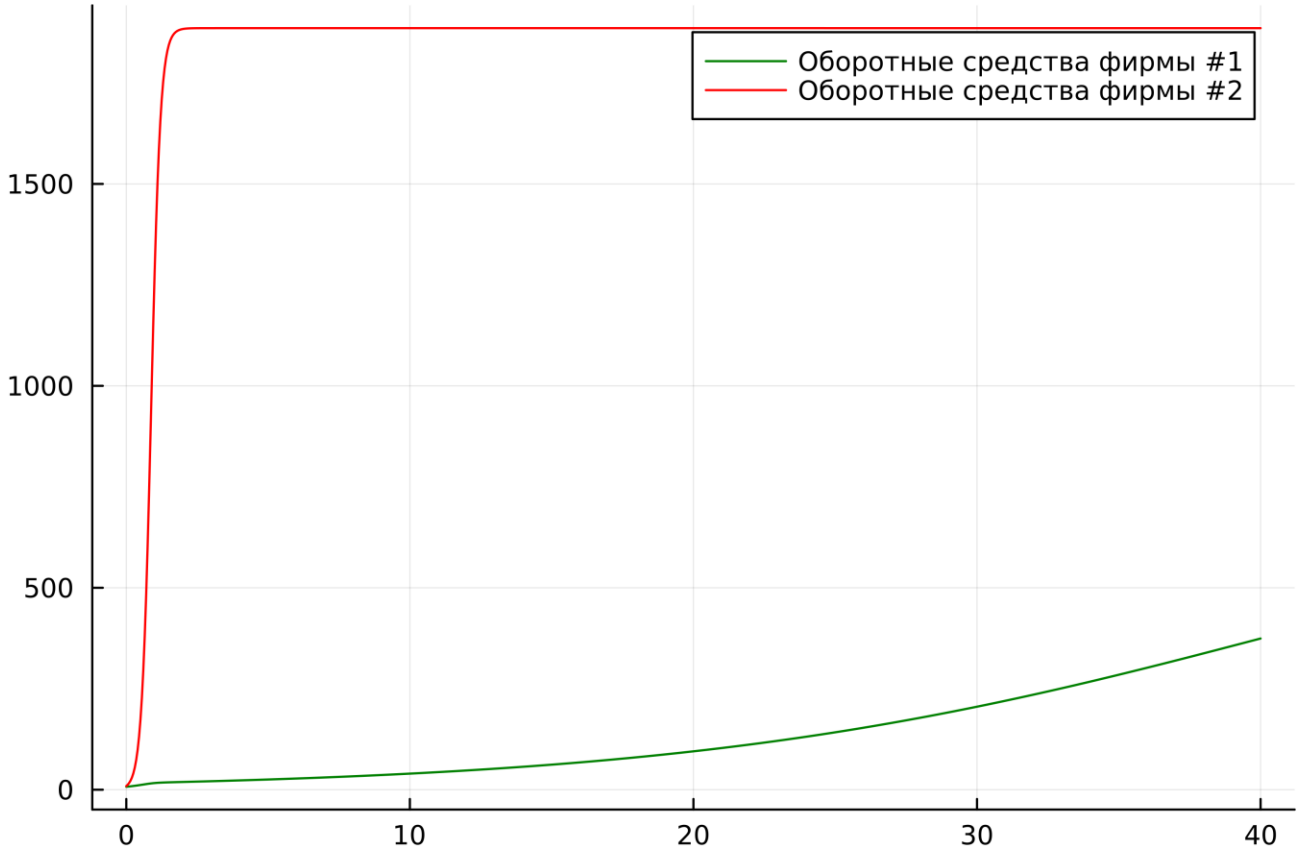
График к 1 задаче



2 задача

```
using Plots
using DifferentialEquations

kr = 42
t1 = 28
p1 =  8.1
t2 = 22
p2 = 10/5
N = 45
q = 1

a1 = kr / (t1 * t1 * p1 * p1 * N * q)
a2 = kr / (t2 * t2 * p2 * p2 * N *q)
b = kr / (t1 * t1 * t2 * t2 * p1 * p1 * p2 * p2 * N * q)
c1 = (kr - p1) / (t1 * p1)
c2 = (kr - p2) / (t2 * p2)


function ode_fn(du, u, p, t)
    M1, M2 = u
    du[1] = u[1] - (b / c1 + 0.00048)*u[1] * u[2] - a1 / c1*u[1] * u[1]
    du[2] = c2 / c1*u[2] - b / c1*u[1] * u[2] - a2 / c1*u[2] * u[2]
end

v0 = [7.2, 9.1]
tspan = (0.0, 40.0)
prob = ODEProblem(ode_fn, v0, tspan)
sol = solve(prob, dtmax = 0.05)
M1 = [u[1] for u in sol.u]
M2 = [u[2] for u in sol.u]
T = [t for t in sol.t]

plt = plot(
  dpi = 600,
  legend = :topright)

plot!(plt, T, M1, label = "Оборотные средства фирмы #1", color = :green)
                                    [ Read 41 lines ]
```

График к 2 задаче



Вывод

- В ходе проделанной лабораторной работы мной были усвоены навыки решения задачи математического моделирования с применением языков программирования для работы с математическими вычислениями Julia.