```maple
> restart;
> # Определим правую часть системы дифференциальных уравнений
  f1 := (x, y) → y;
  f2 := (x, y) → x − x^3;

  # Метод Рунге-Кутты четвертого порядка для системы из двух уравнений
  RK4 := proc( f1, f2, x_0, y_0, h, n )
     local x, y, i, k1_1, k2_1, k3_1, k4_1, k1_2, k2_2, k3_2, k4_2, results;

     # Начальные условия
     x := x_0;
     y := y_0;

     # Список для хранения результатов
     results := [ [0, x, y]];


     for i from 1 to n do
        # Вычисление коэффициентов k
        k1_1 := h * f1(x, y);
        k1_2 := h * f2(x, y);

        k2_1 := h * f1(x + k1_1/2, y + k1_2/2);
        k2_2 := h * f2(x + k1_2/2, y + k1_2/2);

        k3_1 := h * f1(x + k2_1/2, y + k2_2/2);
        k3_2 := h * f2(x + k2_2/2, y + k2_2/2);

        k4_1 := h * f1(x + k3_1, y + k3_2);
        k4_2 := h * f2(x + k3_2, y + k3_2);

        # Обновление значений x и y
        x := x + (1/6) * (k1_1 + 2*k2_1 + 2*k3_1 + k4_1);
        y := y + (1/6) * (k1_2 + 2*k2_2 + 2*k3_2 + k4_2);

        # Сохранение текущих значений
        results := [op(results), [i*h, x, y]];
     end do;

     return results;
  end proc;


  # Начальные условия и параметры
  x_0 := 1;
  y_0 := 0.2;
  h := 0.1;
  n := 100;
```

```
    # Вызов метода Рунге-Кутты
    results := RK4(f1, f2, x_0, y_0, h, n);
```

$$f1 := (x, y) \mapsto y$$
$$f2 := (x, y) \mapsto x - x^3$$

```
RK4 := proc(f1, f2, x_0, y_0, h, n)
    local x, y, i, k1_1, k2_1, k3_1, k4_1, k1_2, k2_2, k3_2, k4_2, results;
    x := x_0;
    y := y_0;
    results := [[0, x, y]];
    for i to n do
        k1_1 := h*f1(x, y);
        k1_2 := h*f2(x, y);
        k2_1 := h*f1(x + 1/2*k1_1, y + 1/2*k1_2);
        k2_2 := h*f2(x + 1/2*k1_2, y + 1/2*k1_2);
        k3_1 := h*f1(x + 1/2*k2_1, y + 1/2*k2_2);
        k3_2 := h*f2(x + 1/2*k2_2, y + 1/2*k2_2);
        k4_1 := h*f1(x + k3_1, y + k3_2);
        k4_2 := h*f2(x + k3_2, y + k3_2);
        x := x + 1/6*k1_1 + 1/3*k2_1 + 1/3*k3_1 + 1/6*k4_1;
        y := y + 1/6*k1_2 + 1/3*k2_2 + 1/3*k3_2 + 1/6*k4_2;
        results := [op(results), [i*h, x, y]]
    end do;
    return results
end proc
```

$$x\_0 := 1$$
$$y\_0 := 0.2$$
$$h := 0.1$$
$$n := 100$$

$results := [[0, 1, 0.2], [0.1, 1.020000000, 0.2], [0.2, 1.039807719, 0.1962855782], [0.3,$ **(1)**
    $1.059043760, 0.1887166676], [0.4, 1.077319048, 0.1772369306], [0.5, 1.094244038,$
    $0.1618886772], [0.6, 1.109439271, 0.1428247770], [0.7, 1.122546881, 0.1203161059], [0.8,$
    $1.133242539, 0.09475324706], [0.9, 1.141247196, 0.06664151745], [1.0, 1.146337929,$
    $0.03658890676], [1.1, 1.148357194, 0.005287132553], [1.2, 1.147219834,$
    $-0.02651331825], [1.3, 1.142917339, -0.05803266445], [1.4, 1.135519008,$
    $-0.08849382517], [1.5, 1.125169905, -0.1171546283], [1.6, 1.112085725,$
    $-0.1433378644], [1.7, 1.096544903, -0.1664570144], [1.8, 1.078878503,$
    $-0.1860359069], [1.9, 1.059458553, -0.2017211702], [2.0, 1.038685558,$

-0.2132870571], [2.1, 1.016975942, -0.2206329229], [2.2, 0.9947500794, -0.2237742746], [2.3, 0.9724214865, -0.2228287731], [2.4, 0.9503875818, -0.2179988466], [2.5, 0.9290222502, -0.2095526432], [2.6, 0.9086702977, -0.1978049250], [2.7, 0.8896437317, -0.1830992584], [2.8, 0.8722196846, -0.1657925049], [2.9, 0.8566397245, -0.1462422571], [3.0, 0.8431102454, -0.1247975171], [3.1, 0.8318036179, -0.1017926242], [3.2, 0.8228597877, -0.07754422117], [3.3, 0.8163880412, -0.05235090108], [3.4, 0.8124686930, -0.02649509659], [3.5, 0.8111544957, -0.000246739077], [3.6, 0.8124716199, 0.02613178654], [3.7, 0.8164200965, 0.05237985334], [3.8, 0.8229736624, 0.07823242036], [3.9, 0.8320789898, 0.1034139240], [4.0, 0.8436543312, 0.1276326918], [4.1, 0.8575876532, 0.1505763630], [4.2, 0.8737343879, 0.1719088355], [4.3, 0.8919149828, 0.1912692900], [4.4, 0.9119124857, 0.2082738601], [4.5, 0.9334704626, 0.2225204897], [4.6, 0.9562915907, 0.2335974406], [4.7, 0.9800373155, 0.2410957494], [4.8, 1.004328972, 0.2446256720], [4.9, 1.028750760, 0.2438368017], [5.0, 1.052854906, 0.2384411049], [5.1, 1.076169242, 0.2282376294], [5.2, 1.098207279, 0.2131371621], [5.3, 1.118480659, 0.1931847184], [5.4, 1.136513622, 0.1685775142], [5.5, 1.151858917, 0.1396760913], [5.6, 1.164114339, 0.1070065635], [5.7, 1.172938914, 0.07125256260], [5.8, 1.178067660, 0.03323633416], [5.9, 1.179323859, -0.006110521550], [6.0, 1.176627897, -0.04578506639], [6.1, 1.170001936, -0.08475720757], [6.2, 1.159570011, -0.1220166956], [6.3, 1.145553486, -0.1566191967], [6.4, 1.128262186, -0.1877277337], [6.5, 1.108081841, -0.2146462662], [6.6, 1.085458777, -0.2368430190], [6.7, 1.060882933, -0.2539622812], [6.8, 1.034870346, -0.2658245872], [6.9, 1.007946200, -0.2724163303], [7.0, 0.9806293581, -0.2738707700], [7.1, 0.9534191033, -0.2704429867], [7.2, 0.9267845226, -0.2624815705], [7.3, 0.9011567199, -0.2503997099], [7.4, 0.8769238002, -0.2346479590], [7.5, 0.8544283715, -0.2156903963], [7.6, 0.8339671752, -0.1939852631], [7.7, 0.8157923820, -0.1699705730], [7.8, 0.8001140630, -0.1440546884], [7.9, 0.7871033641, -0.1166114962], [8.0, 0.7768959602, -0.08797959027], [8.1, 0.7695954253, -0.05846476367], [8.2, 0.7652762264, -0.02834510474], [8.3, 0.7639861143, 0.002121966187], [8.4, 0.7657477454, 0.03269130701], [8.5, 0.7705594249, 0.06312082764], [8.6, 0.7783949090, 0.09316189131], [8.7, 0.7892022499, 0.1225497876], [8.8, 0.8029017116, 0.1509947403], [8.9, 0.8193828350, 0.1781739709], [9.0, 0.8385007890, 0.2037254261], [9.1, 0.8600722069, 0.2272438852], [9.2, 0.8838707916, 0.2482802596], [9.3, 0.9096230546, 0.2663449627], [9.4, 0.9370046456, 0.2809162137], [9.5, 0.9656378100, 0.2914540102], [9.6, 0.9950905747, 0.2974202188], [9.7, 1.024878284, 0.2983047697], [9.8, 1.054468073, 0.2936573006], [9.9, 1.083286760, 0.2831228065], [10.0, 1.110732436, 0.2664790154]]

> *# Разделение результатов на списки t, x, y для построения графиков*

```
t_values := [seq(results[i][1], i = 1 ..n + 1)];
x_values := [seq(results[i][2], i = 1 ..n + 1)];
y_values := [seq(results[i][3], i = 1 ..n + 1)];

# Построение графиков
with(plots) :
# График x(t)
p1 := plot([seq([x_values[i], y_values[i]], i = 1 ..n + 1)], title = "x(t)", color = blue) :

# График y(t)
p2 := plot([seq([x_values[i], y_values[i]], i = 1 ..n + 1)], title = "y(t)", color = red) :

# Отобразим все графики
display([p1, p2]);
```

$t\_values := [0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0,$
$2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2,$
$4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.0, 6.1, 6.2, 6.3, 6.4,$
$6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6,$
$8.7, 8.8, 8.9, 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 10.0]$

$x\_values := [1, 1.020000000, 1.039807719, 1.059043760, 1.077319048, 1.094244038, 1.109439271,$
$1.122546881, 1.133242539, 1.141247196, 1.146337929, 1.148357194, 1.147219834,$
$1.142917339, 1.135519008, 1.125169905, 1.112085725, 1.096544903, 1.078878503,$
$1.059458553, 1.038685558, 1.016975942, 0.9947500794, 0.9724214865, 0.9503875818,$
$0.9290222502, 0.9086702977, 0.8896437317, 0.8722196846, 0.8566397245, 0.8431102454,$
$0.8318036179, 0.8228597877, 0.8163880412, 0.8124686930, 0.8111544957, 0.8124716199,$
$0.8164200965, 0.8229736624, 0.8320789898, 0.8436543312, 0.8575876532, 0.8737343879,$
$0.8919149828, 0.9119124857, 0.9334704626, 0.9562915907, 0.9800373155, 1.004328972,$
$1.028750760, 1.052854906, 1.076169242, 1.098207279, 1.118480659, 1.136513622,$
$1.151858917, 1.164114339, 1.172938914, 1.178067660, 1.179323859, 1.176627897,$
$1.170001936, 1.159570011, 1.145553486, 1.128262186, 1.108081841, 1.085458777,$
$1.060882933, 1.034870346, 1.007946200, 0.9806293581, 0.9534191033, 0.9267845226,$
$0.9011567199, 0.8769238002, 0.8544283715, 0.8339671752, 0.8157923820, 0.8001140630,$
$0.7871033641, 0.7768959602, 0.7695954253, 0.7652762264, 0.7639861143, 0.7657477454,$
$0.7705594249, 0.7783949090, 0.7892022499, 0.8029017116, 0.8193828350, 0.8385007890,$
$0.8600722069, 0.8838707916, 0.9096230546, 0.9370046456, 0.9656378100, 0.9950905747,$
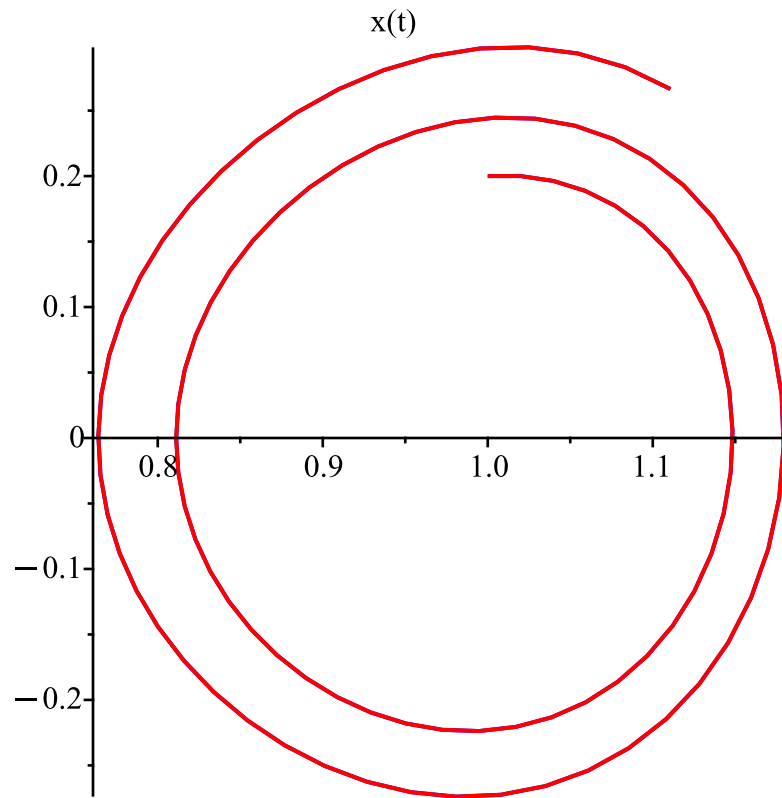$1.024878284, 1.054468073, 1.083286760, 1.110732436]$

$y\_values := [0.2, 0.2, 0.1962855782, 0.1887166676, 0.1772369306, 0.1618886772, 0.1428247770,$
$0.1203161059, 0.09475324706, 0.06664151745, 0.03658890676, 0.005287132553,$
$-0.02651331825, -0.05803266445, -0.08849382517, -0.1171546283, -0.1433378644,$
$-0.1664570144, -0.1860359069, -0.2017211702, -0.2132870571, -0.2206329229,$
$-0.2237742746, -0.2228287731, -0.2179988466, -0.2095526432, -0.1978049250,$

−0.1830992584, −0.1657925049, −0.1462422571, −0.1247975171, −0.1017926242, −0.07754422117, −0.05235090108, −0.02649509659, −0.000246739077, 0.02613178654, 0.05237985334, 0.07823242036, 0.1034139240, 0.1276326918, 0.1505763630, 0.1719088355, 0.1912692900, 0.2082738601, 0.2225204897, 0.2335974406, 0.2410957494, 0.2446256720, 0.2438368017, 0.2384411049, 0.2282376294, 0.2131371621, 0.1931847184, 0.1685775142, 0.1396760913, 0.1070065635, 0.07125256260, 0.03323633416, −0.006110521550, −0.04578506639, −0.08475720757, −0.1220166956, −0.1566191967, −0.1877277337, −0.2146462662, −0.2368430190, −0.2539622812, −0.2658245872, −0.2724163303, −0.2738707700, −0.2704429867, −0.2624815705, −0.2503997099, −0.2346479590, −0.2156903963, −0.1939852631, −0.1699705730, −0.1440546884, −0.1166114962, −0.08797959027, −0.05846476367, −0.02834510474, 0.002121966187, 0.03269130701, 0.06312082764, 0.09316189131, 0.1225497876, 0.1509947403, 0.1781739709, 0.2037254261, 0.2272438852, 0.2482802596, 0.2663449627, 0.2809162137, 0.2914540102, 0.2974202188, 0.2983047697, 0.2936573006, 0.2831228065, 0.2664790154]

x(t)