```
> with(DEtools):
  #Тимофеев К.А. Лабораторная 3.3 Вариант 6
  #Задание 1
> dsolve({diff(y1(x),x) = 9·y1(x) + 7·y2(x), diff(y2(x),x) = 3·y1(x) + 5·y2(x)}, {y1, y2})
```

$$\left\{y_1(x) = \_C1\, e^{12x} + \_C2\, e^{2x},\ y_2(x) = \frac{3\,\_C1\, e^{12x}}{7} - \_C2\, e^{2x}\right\} \tag{1}$$

```
> y1(x, _C1, _C2) := _C1 e^(12 x) + _C2 e^(2 x);
```

$$y_1 := (x, \_C1, \_C2) \to \_C1\, e^{12x} + \_C2\, e^{2x} \tag{2}$$

```
> y2(x, _C1, _C2) := 3 _C1 e^(12 x)/7 - _C2 e^(2 x);
```

$$y_2 := (x, \_C1, \_C2) \to \frac{3}{7}\,\_C1\, e^{12x} - \_C2\, e^{2x} \tag{3}$$

```
> solve({y1(2, C1, C2) = 1, y2(2, C1, C2) = 0}, {C1, C2});
  _C := %;
  _C[1];
  cC[1] := rhs(_C[1]);
  cC[2] := rhs(_C[2]);

  plots[spacecurve]([x, y1(x, cC[1], cC[2]), y2(x, cC[1], cC[2])], x = -1..1)
```

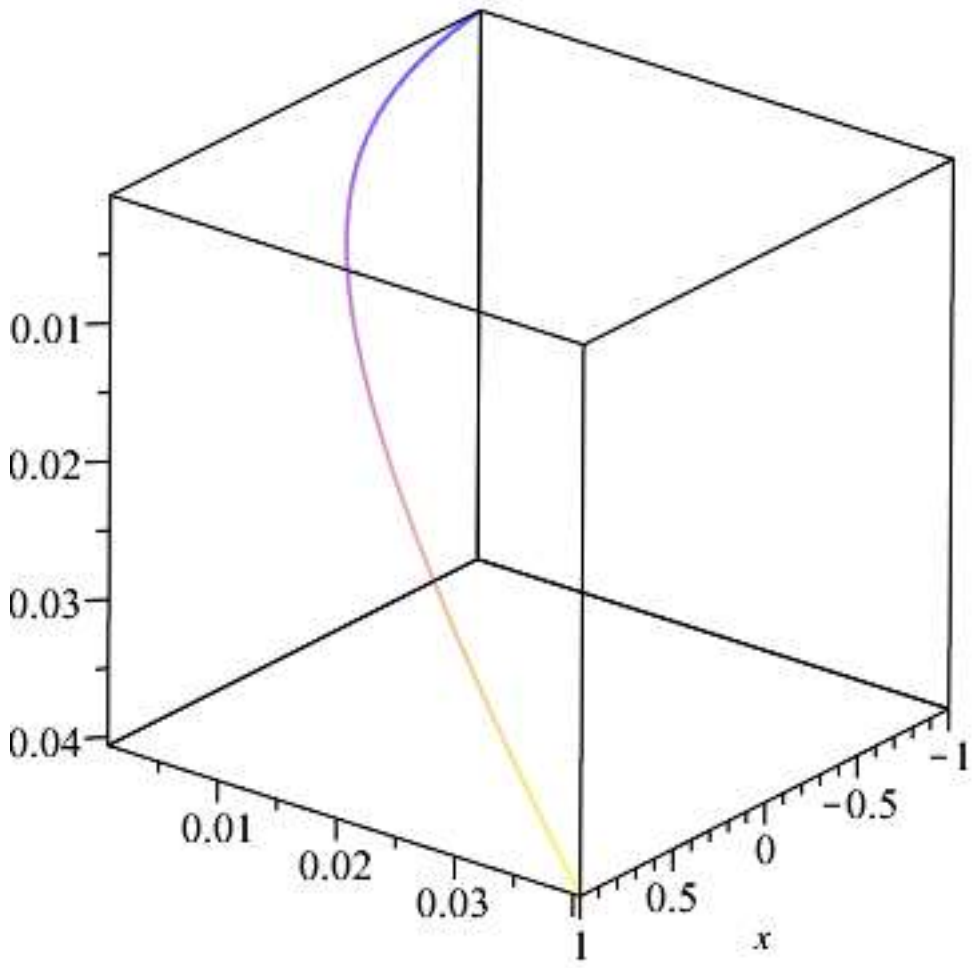
$$\left\{C1 = \frac{7}{10\, e^{24}},\ C2 = \frac{3}{10\, e^{4}}\right\}$$

$$\_C := \left\{C1 = \frac{7}{10\, e^{24}},\ C2 = \frac{3}{10\, e^{4}}\right\}$$

$$C1 = \frac{7}{10\, e^{24}}$$

$$cC_1 := \frac{7}{10\, e^{24}}$$

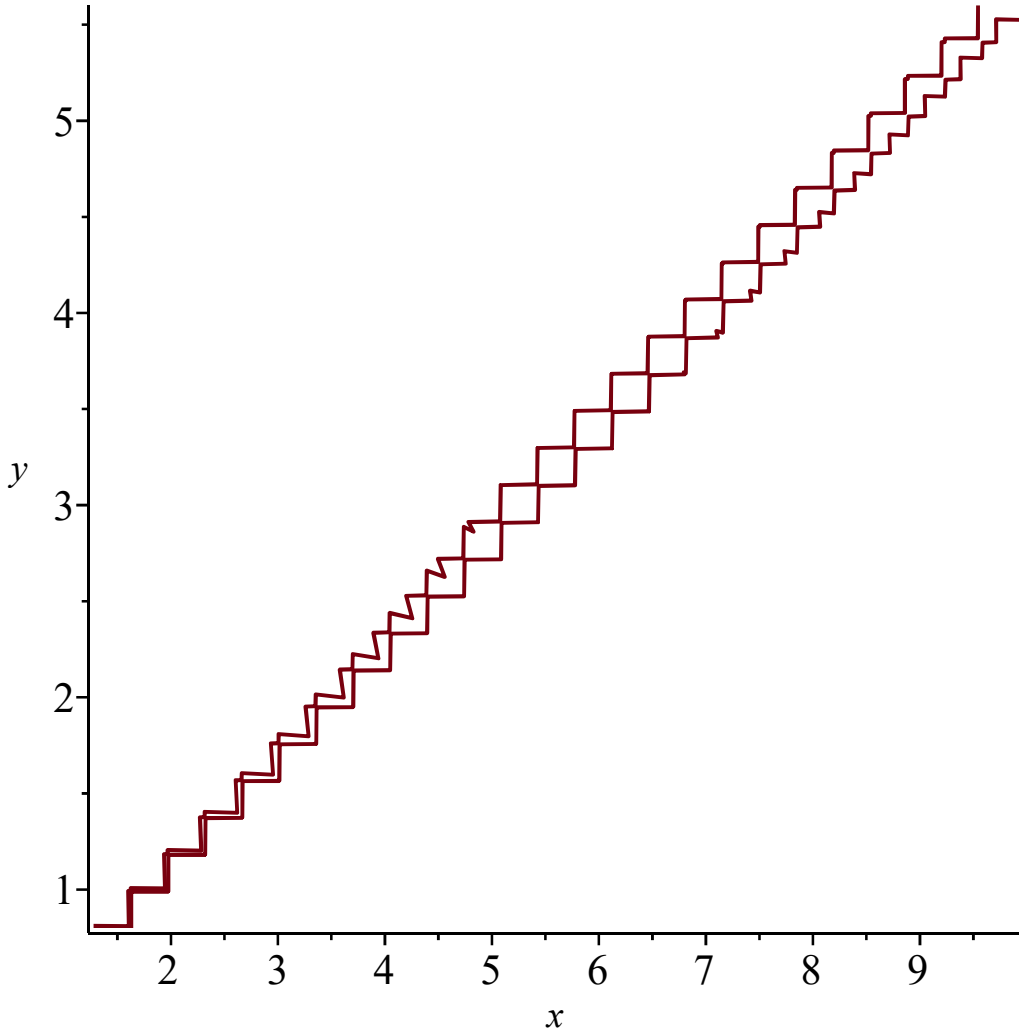
$$cC_2 := \frac{3}{10\, e^{4}}$$



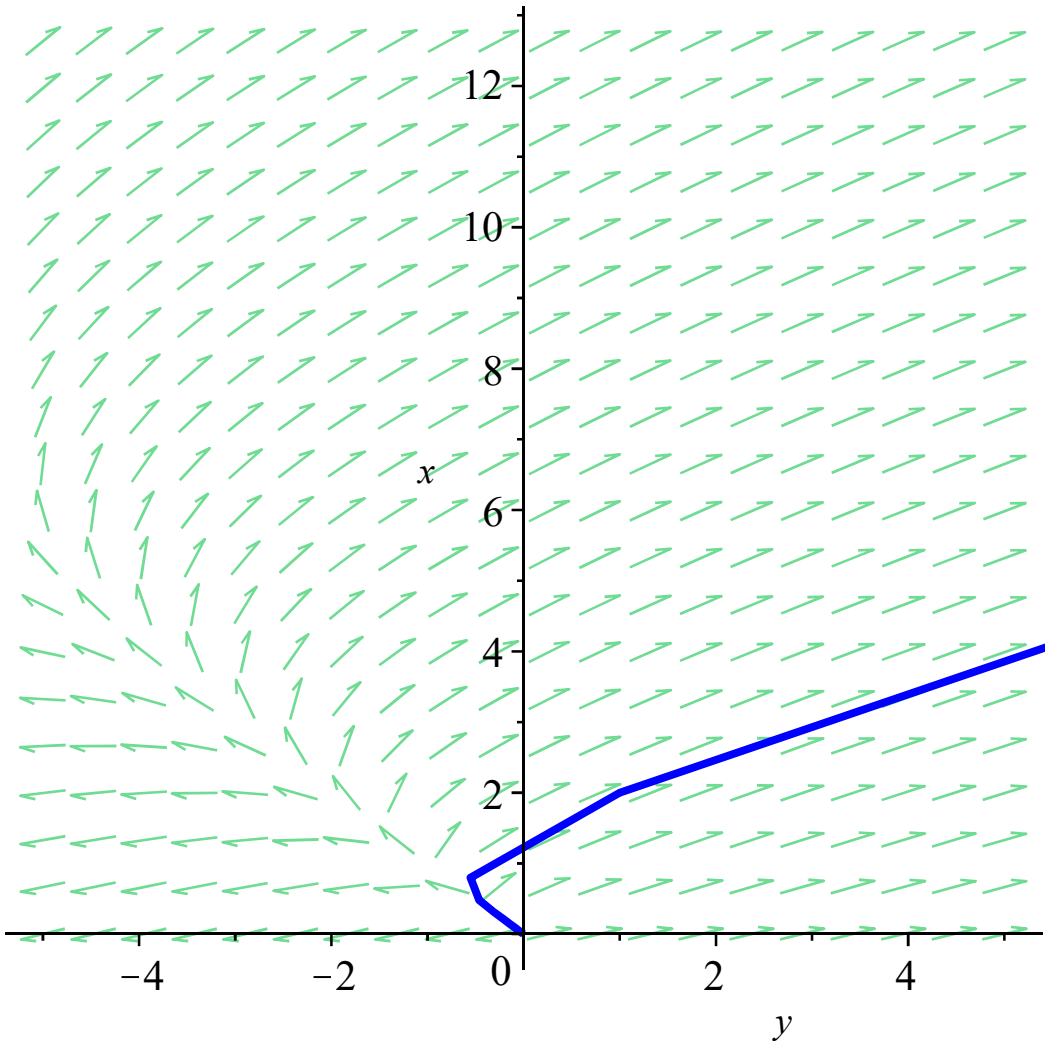
> $y_1(x, 1, 0)$

$$e^{12x} \quad \textbf{(4)}$$

> *restart* :
plots[*implicitplot*]$\left((7\cdot y - 4\cdot x)^6 = 1\cdot(y + x),\ x = -10..10, y = -10..10\right)$




```
> phaseportrait( {diff(y(t), t) = 9·y(t) + 7·x(t), diff(x(t), t) = 3·y(t) + 5·x(t)}, [y(t), x(t)], t
    = -5 .. 5, [[y(0) = 1, x(0) = 2]], y = -5 .. 5, color = aquamarine, linecolor = blue)
```



> #Задание 2

```
restart :
dsolve( {diff (y1(x), x) = -4·y1(x) + 7·y2(x), diff (y2(x), x) = y1(x) + 2·y2(x)}, {y1, y2})
```

$$\left\{y_1(x) = \_C1\, e^{3x} + \_C2\, e^{-5x},\ y_2(x) = \_C1\, e^{3x} - \frac{\_C2\, e^{-5x}}{7}\right\} \quad (5)$$

> #Задание 3

```
dsolve( {diff (x(t), t) = 2·y(t) + 1, diff (y(t), t) = 2·x(t) + 3}, {x, y})
```

$$\left\{x(t) = e^{-2t}\,\_C2 + e^{2t}\,\_C1 - \frac{3}{2},\ y(t) = -e^{-2t}\,\_C2 + e^{2t}\,\_C1 - \frac{1}{2}\right\} \quad (6)$$

> $Hx := e^{-2t}\,\_C2 + e^{2t}\,\_C1 - \frac{3}{2};$

$Hy := -e^{-2t}\,\_C2 + e^{2t}\,\_C1 - \frac{1}{2};$

$$Hx := e^{-2t}\,\_C2 + e^{2t}\,\_C1 - \frac{3}{2}$$

$$Hy := -e^{-2t}\,\_C2 + e^{2t}\,\_C1 - \frac{1}{2} \quad (7)$$

> $g[1] := subs(t = 0, Hx);$

```
g[2] := subs(t = 0, Hy);
solve({g[1] = -1, g[2] = 0}, [_C1, _C2]);
```

$$g_1 := e^0 \_C2 + e^0 \_C1 - \frac{3}{2}$$

$$g_2 := -e^0 \_C2 + e^0 \_C1 - \frac{1}{2}$$

$$\left[\left[\_C1 = \frac{1}{2}, \_C2 = 0\right]\right] \quad \textbf{(8)}$$

>