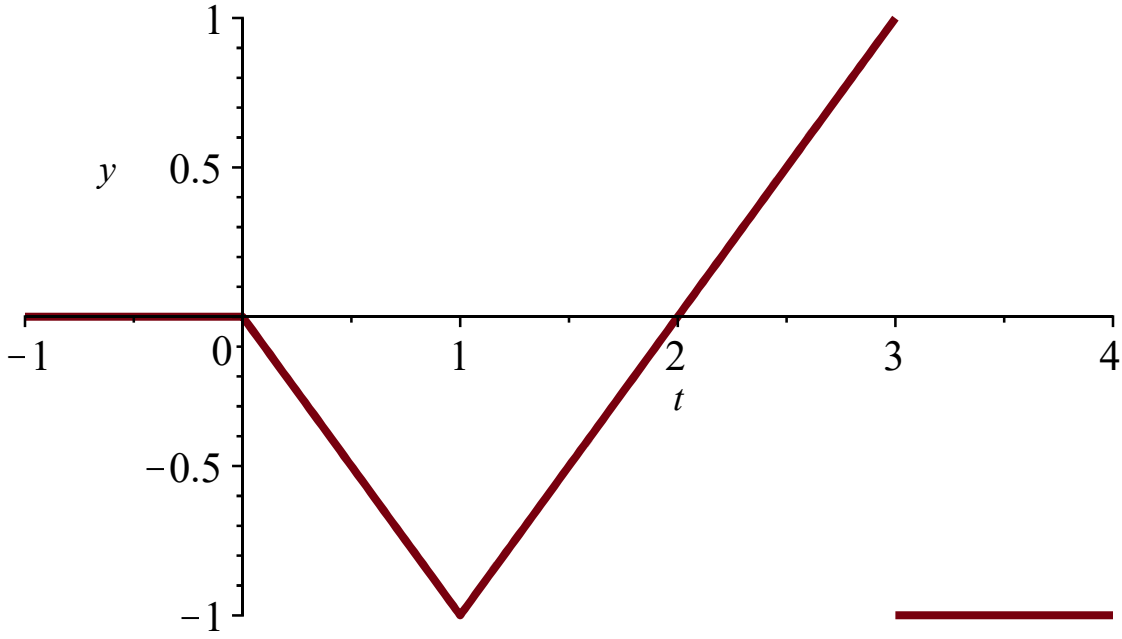
```
> plot(-t·Heaviside(t) + 2(t − 1) Heaviside(t − 1) + (-t + 1)·Heaviside(t − 3), t = -1..4, y = -1..1, discont = true, thickness = 3);
  inttrans[laplace](-(t/a)·Heaviside(t) + (2/a)(t − a) Heaviside(t − a) + (1/a)·(-t + a)·Heaviside(t − 3a), t, p) assuming a > 0;
```



$$\frac{-1 + 2\,e^{-p\,a} - (2\,p\,a + 1)\,e^{-3\,p\,a}}{a\,p^2} \qquad (1)$$

Задание 2

```
> f(p) := (1 − p)/(p·(p^2 + 3p + 3)):
  f(p) = convert(f(p), parfrac);
  inttrans[invlaplace](f(p), p, t);
```

$$\frac{1-p}{p\,(p^2+3\,p+3)} = \frac{1}{3\,p} + \frac{-6-p}{3\,(p^2+3\,p+3)}$$

$$\frac{1}{3} - \frac{e^{-\frac{3\,t}{2}}\left(3\sqrt{3}\,\sin\left(\frac{\sqrt{3}\,t}{2}\right) + \cos\left(\frac{\sqrt{3}\,t}{2}\right)\right)}{3} \qquad (2)$$

Задание 3

```
> equat := y''(t) + 2y'(t) + y(t) = e^(-t)/(t + 1):
  cond := y(0) = 0, y'(0) = 0:
  simplify(dsolve({equat, cond}, y(t)));
```

$$y(t) = \left(\left(\int_0^t \frac{e^{-\_z1}\,e^{\_z1}}{\_z1+1}\,d\_z1\right)t - \left(\int_0^t \frac{\_z1\,e^{-\_z1}\,e^{\_z1}}{\_z1+1}\,d\_z1\right)\right)e^{-t} \qquad (3)$$

Задание 4

```
> equat := y''(t) - 3 y'(t) + 2·y(t) = 2·e^t :
  cond := y(0) = 1, y'(0) = 0 :
  dsolve( {equat, cond}, y(t) );
```

$$y(t) = \frac{2\,e^{t}}{\ln(e)^{2} - 3\ln(e) + 2} - \frac{e^{2t}\ln(e)}{\ln(e) - 2} + \frac{2\,e^{t}\ln(e)}{\ln(e) - 1} \tag{4}$$

Задание 5

```
> syst := { p·X + 1 = 2 X + 3 Y + 1/p, p·Y = 4 X - 2 Y } :
  solve(syst, {X, Y} );
```

$$\left\{X = -\frac{(p+2)\,(p-1)}{p\,(p^{2}-16)},\ Y = -\frac{4\,(p-1)}{p\,(p^{2}-16)}\right\} \tag{5}$$

```
> X = convert( -(p + 2) (p - 1) / (p (p^2 - 16)), parfrac );
  Y = convert( -4 (p - 1) / (p (p^2 - 16)), parfrac );
```

$$X = -\frac{1}{8p} - \frac{5}{16\,(p+4)} - \frac{9}{16\,(p-4)}$$

$$Y = -\frac{1}{4p} + \frac{5}{8\,(p+4)} - \frac{3}{8\,(p-4)} \tag{6}$$

```
> x(t) = invlaplace( -1/(8p) - 5/(16 (p + 4)) - 9/(16 (p - 4)), p, t );
  y(t) = invlaplace( -1/(4p) + 5/(8 (p + 4)) - 3/(8 (p - 4)), p, t );
```

$$x(t) = -\frac{1}{8} - \frac{7\cosh(4\,t)}{8} - \frac{\sinh(4\,t)}{4}$$

$$y(t) = -\frac{1}{4} + \frac{\cosh(4\,t)}{4} - \sinh(4\,t) \tag{7}$$

```
> syst := x'(t) = 2 x(t) + 3 y(t) + 1, y'(t) = 4 x(t) - 2 y(t) :
  cond := x(0) = -1, y(0) = 0 :
  dsolve( {syst, cond}, {x(t), y(t)} );
```

$$\left\{x(t) = -\frac{9\,e^{4t}}{16} - \frac{5\,e^{-4t}}{16} - \frac{1}{8},\ y(t) = -\frac{3\,e^{4t}}{8} + \frac{5\,e^{-4t}}{8} - \frac{1}{4}\right\} \tag{8}$$

```
>
>
```