In [1]:

```
numerator(x)=x^4+4*x^3+3*x^2-3
denominator(x)=x^2+3*x+2
f(x)=numerator(x)/denominator(x)
show(f)
```

Out[1]:

$$x \mapsto \frac{x^4 + 4\,x^3 + 3\,x^2 - 3}{x^2 + 3\,x + 2}$$

In [2]:

```
[quotient,remainder]=(numerator(x)).maxima_methods().divide(denominator(x))
show(quotient)
```

Out[2]:

$$x^2 + x - 2$$

In [3]:

```
show(remainder)
```

Out[3]:

$$4\,x + 1$$

In [4]:

```
show(factor(denominator(x)))
```

Out[4]:

$$(x + 2)(x + 1)$$

In [5]:

```
show((remainder(x)/denominator(x)).partial_fraction())
```

Out[5]:

$$\frac{7}{x + 2} - \frac{3}{x + 1}$$

In [6]:

```
# double check
show(f.partial_fraction())
```
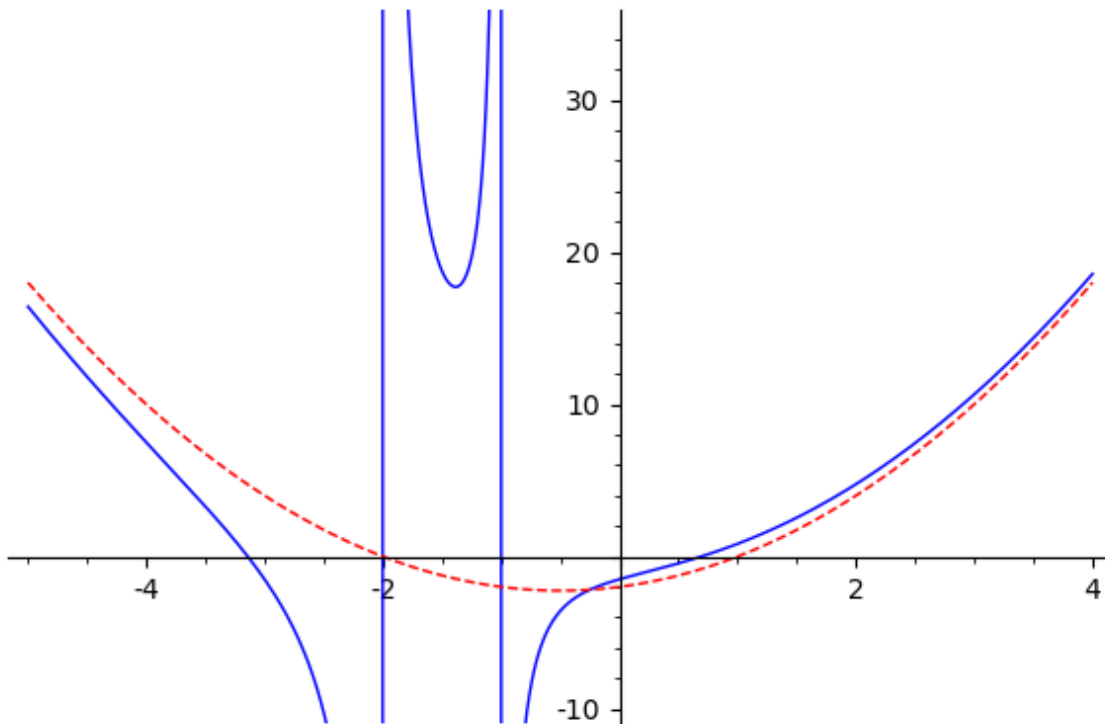
Out[6]:

$$x \mapsto x^2 + x + \frac{7}{x + 2} - \frac{3}{x + 1} - 2$$

```
p1=plot(f(x),x,-5,4)
p2=plot(quotient(x),x,-5,4,  rgbcolor="red",  linestyle = "dashed")
(p1+p2).show(xmin=-5, xmax=4, ymin=-10, ymax=35)
```

Out[7]:

In [0]: