```
> restart;
> simplify(hypergeom([a,b], [c],x))=simplify((-a)!/pochhammer(c,-a)
  *JacobiP(-a,c-1,a+b-c,-2*x+1));
```

$$\text{hypergeom}([a, b], [c], x) = \frac{(-a)!\,\text{JacobiP}(-a, c-1, a+b-c, -2x+1)}{\text{pochhammer}(c, -a)} \tag{1}$$

```
> a:=-3;
```

$$a := -3 \tag{2}$$

```
> simplify(expand(sort(hypergeom([a,b], [c], x))))*x^(b);
```

$$-\frac{1}{c\,(c+1)\,(c+2)}\left(\left(b^3x^3-3\,b^2cx^2+3\,b^2x^3-6\,b^2x^2+3\,bc^2x-3\,bcx^2+2\,bx^3\right.\right. \tag{3}$$
$$\left.\left.+9\,bcx-6\,bx^2-c^3+6\,bx-3\,c^2-2\,c\right)x^b\right)$$

```
> simplify(expand(sort((-a)!/pochhammer(c,-a)*JacobiP(-a,c-1,a+b-c,
  1-2*x))))*x^(b);
```

$$-\frac{1}{c\left(c^2+3\,c+2\right)}\left(\left(b^3x^3-3\,b^2cx^2+3\,b^2x^3-6\,b^2x^2+3\,bc^2x-3\,bcx^2+2\,bx^3\right.\right. \tag{4}$$
$$\left.\left.+9\,bcx-6\,bx^2-c^3+6\,bx-3\,c^2-2\,c\right)x^b\right)$$

```
> phi:=simplify((-a)!/pochhammer(c,-a)*JacobiP(-a,c-1,a+b-c,-2*x+1)
  );
```

$$\phi := -\frac{1}{c\,(c+1)\,(c+2)}\left(b^3x^3-3\,b^2cx^2+3\,b^2x^3-6\,b^2x^2+3\,bc^2x-3\,bcx^2+2\,bx^3\right. \tag{5}$$
$$\left.+9\,bcx-6\,bx^2-c^3+6\,bx-3\,c^2-2\,c\right)$$