15b. Intertwining operator $v \mapsto -v$

Check of (3.80)

```
In[ ]:= Clear[c]
        c[h_, p_, r_, nu_] := Gamma[1 + (p - nu) / 2 + (h - r) / 4] Gamma[1 + (p - nu) / 2 + (r - h) / 4]
            Gamma[1 + (p + nu) / 2 + (h - r) / 4]^(-1) Gamma[1 + (p + nu) / 2 + (r - h) / 4]^(-1);

In[ ]:= Clear[ii0]
        ii0[t^(2 + nu_) Phi[h_, p_, r_, q_]] := c[h, p, r, nu] × phi[h, p, r, q, -nu]
        ii0[ff_ gg_] := ff ii0[gg] /; FreeQ[ff, t] && FreeQ[ff, Phi]
```

Inverse

```
In[ ]:= phi[h, p, r, q, nu]
        ii0[%]
        ii0[%]
```

$$\text{Out[ ]= } t^{2+nu}\ \text{Phi}[h, p, r, q]$$

$$\text{Out[ ]= } \left(t^{2-nu}\ \text{Gamma}\left[1+\frac{1}{2}(-nu+p)+\frac{h-r}{4}\right]\text{Gamma}\left[1+\frac{1}{2}(-nu+p)+\frac{1}{4}(-h+r)\right]\text{Phi}[h, p, r, q]\right)\Big/ \left(\text{Gamma}\left[1+\frac{nu+p}{2}+\frac{h-r}{4}\right]\text{Gamma}\left[1+\frac{nu+p}{2}+\frac{1}{4}(-h+r)\right]\right)$$

$$\text{Out[ ]= } t^{2+nu}\ \text{Phi}[h, p, r, q]$$

Check of intertwining property for shift operators

```
In[ ]:= Clear[h, p, r, nu]
        ii0[sh[3, 1, phi[h, p, r, p, nu], subtriv]] /
          sh[3, 1, ii0[phi[h, p, r, p, nu]], subtriv] // FullSimplify
```

$$\text{Out[ ]= } 1$$

```
In[ ]:=
```

```
        ii0[sh[3, -1, phi[h, p, r, p, nu], subtriv]] /
          sh[3, -1, ii0[phi[h, p, r, p, nu]], subtriv] // FullSimplify
```

$$\text{Out[ ]= } 1$$

```
In[ ]:=
        ii0[sh[-3, 1, phi[h, p, r, p, nu], subtriv]] /
          sh[-3, 1, ii0[phi[h, p, r, p, nu]], subtriv] // FullSimplify
```

$$\text{Out[ ]= } 1$$

2

In[ ]:=
```
ii0[sh[-3, -1, phi[h, p, r, p, nu], subtriv]]/
  sh[-3, -1, ii0[phi[h, p, r, p, nu]], subtriv] // FullSimplify
```

Out[ ]= 1