20a. Check of the relations in (4.11)

In these cases we need only one component.

We use that $r_0 = \pm p - 2\varepsilon m_0$.

For $x^{p,0}$ and $\varepsilon = 1$ we have $r_0 = p - 2m_0$ and hence $r_0 < -p$,

and for $x^{0,p}$ and ε=-1 we have $r_0 = -p + 2m_0$>p.

In[ ]:=
```
Clear[m, m0, factor]
msub = {m[h_, r_] :→ m0 + (eps / 6) (3 r + 2 j - h)}
```

Case $x^{p,0}$, ε=1, $p < m_0$

Determining components of order - p (for $x^{p,0}$) and -p-1 (for $x^{p+1,0}$).

In[ ]:=
```
F = tht[m[h, -p]] × f[-p, t] × Phi[h, p, -p, p]
```

In[ ]:=
```
sh[3, 1, F, subnab] /. eps → 1 // Simplify
Coefficient[%, Phi[h + 3, p + 1, -p - 1, p + 1]] // Simplify
% == factor tht[m[h + 3, -p - 1]] t f[-p, t] /. msub /. h → 2 j + 3 p /. eps → 1 // Simplify
Solve[%, factor]
```

In[ ]:=

Case $x^{p,0}$, ε=-1

Determining components of order - p and -p-1

In[ ]:=
```
F = tht[m[h, -p]] × f[-p, t] × Phi[h, p, -p, p]
```

In[ ]:=
```
sh[3, 1, F, subnab] /. eps → -1 // Simplify
Coefficient[%, Phi[h + 3, p + 1, -p - 1, p + 1]] // Simplify
% == factor tht[m[h + 3, -p - 1]] t f[-p, t] /. msub /. h → 2 j + 3 p /. eps → -1 // Simplify
Solve[%, factor]
```

In[ ]:=

Case $x^{0,p}$, ε=1

Determining components of order p and p+1

In[ ]:=
```
F = tht[m[h, p]] × f[p, t] × Phi[h, p, p, p]
```

In[ ]:=
```
sh[-3, 1, F, subnab] /. eps → 1 // Simplify
Coefficient[%, Phi[h - 3, p + 1, p + 1, p + 1]] // Simplify
% == factor tht[m[h - 3, p + 1]] t f[p, t] /. msub /. h → 2 j - 3 p /. eps → 1 // Simplify
Solve[%, factor]
```

In[ ]:=

Case $x^{p,0}$, ε=-1, $p < m_0$

Determining components of order p and p+1

In[ ]:=
```
F = tht[m[h, p]] × f[p, t] × Phi[h, p, p, p]
```

In[ ]:=
```
sh[-3, 1, F, subnab] /. eps → -1 // Simplify
Coefficient[%, Phi[h - 3, p + 1, p + 1, p + 1]] // Simplify
% == factor tht[m[h - 3, p + 1]] t f[p, t] /. msub /. h → 2 j - 3 p /. eps → -1 // Simplify
Solve[%, factor]
```