3d. Cartan subalgebras

See §3.1

Non-compact Cartan subalgebra

Cartan algebra spanned by **HHi** and **HHr**

```
In[ ]:= lb[HHi, HHr]
Out[ ]= -nul
```

Check of Table 3.3

```
In[ ]:= {lb[HHr, XX1 + I XX2], lb[HHi, XX1 + I XX2]} == {XX1 + I XX2, (-3 I) (XX1 + I XX2)} // Simplify
        {lb[HHr, XX1 - I XX2], lb[HHi, XX1 - I XX2]} == {XX1 - I XX2, 3 I (XX1 - I XX2)} // Simplify
        {lb[HHr, XX0], lb[HHi, XX0]}
Out[ ]= True
Out[ ]= True
Out[ ]= {2 XX0, nul}
In[ ]:=
```

Compact Cartan subalgebra

Check of Table 3.2

In[ ]:=
```
Z12 //. Liesub0
Z23 //. Liesub0 // Expand
Z13 //. Liesub0 // Expand
Z21 //. Liesub0 // Expand
Z32 //. Liesub0 // Expand
Z31 //. Liesub0 // Expand
```

Out[ ]= $WW1 - i\, WW2$

Out[ ]= $-\frac{WW1}{2} - \frac{i\, WW2}{2} + \frac{XX1}{2} + \frac{i\, XX2}{2}$

Out[ ]= $\frac{i\, HHi}{2} + \frac{HHr}{2} - i\, WW0 + i\, XX0$

Out[ ]= $WW1 + i\, WW2$

Out[ ]= $-\frac{WW1}{2} + \frac{i\, WW2}{2} + \frac{XX1}{2} - \frac{i\, XX2}{2}$

Out[ ]= $-\frac{i\, HHi}{2} + \frac{HHr}{2} + i\, WW0 - i\, XX0$

In[ ]:=
```
lb[CKi, Z12]
lb[CKi, Z23]
lb[CKi, Z13]
lb[CKi, Z21]
lb[CKi, Z32]
lb[CKi, Z31]
```

Out[ ]= nul

Out[ ]= $3\, i\, Z23$

Out[ ]= $3\, i\, Z13$

Out[ ]= nul

Out[ ]= $-3\, i\, Z32$

Out[ ]= $-3\, i\, Z31$

In[ ]:=
```
lb[WW0, Z12]
lb[WW0, Z23]
lb[WW0, Z13]
lb[WW0, Z21]
lb[WW0, Z32]
lb[WW0, Z31]
```

Out[ ]= $2\,i\,Z12$

Out[ ]= $-i\,Z23$

Out[ ]= $i\,Z13$

Out[ ]= $-2\,i\,Z21$

Out[ ]= $i\,Z32$

Out[ ]= $-i\,Z31$