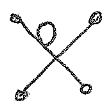
- both vertices give $\frac{1}{4!}$ $\left(\frac{1}{4!}\lambda\varphi^4\right)$
- $\exp(iS_I) = 1 + iS_I + \frac{(i)^2}{2!}S_I^2 + \dots$
  was expanded to 2nd order to get λ^2.
  Thus, we get extra $\frac{1}{2!}$

$\Rightarrow$ thus, overall $S = \frac{8\cdot 3\cdot 4\cdot 3\cdot 2}{(4!)^2\cdot 2!} = \frac{1}{2}$.

Examples:

$S = \frac{4\cdot 3\cdot 2\cdot 1}{4!\ 1!} = 1$ as we got before



$S = \frac{8\cdot 4\cdot 3\cdot 2\cdot 3}{(4!)^2\cdot 2!} = \frac{1}{2}$

$S = \frac{\overset{x}{8}\cdot\overset{y}{4}\cdot\overset{a_1\to b}{3}\cdot\overset{a_2}{2}\cdot\overset{a_1}{1}}{(4!)^2\cdot 2!} = \frac{1}{3}$

$S = \frac{3\cdot 1}{4!\,1!} = \frac{1}{8}$

Choose any leg, 3 options to connect to another.

- The factor $\frac{1}{4!}$ could as well be included in Z. However, this way is more customary. As we see, $4!$ is largely cancelled!

- For Amputated Green functions the external propagators are substituted by δ-functions (2.43) ; $G_F(x-y) \to \delta^{(4)}(x-y)$