1.

From the Srednicki solution manual:

8.5) For $x^0 > y^0$, we must close the contour in the lower-half k^0 plane. The result will vanish if both poles are above the real k^0 axis, so this is the prescription that yields $\Delta_{\rm ret}(x-y)$. We can implement this prescription via

$$\begin{aligned}\Delta_{\rm ret}(x-y) &= \int \frac{d^4k}{(2\pi)^4} \frac{e^{ik(x-y)}}{-(k^0-i\epsilon)^2+\mathbf{k}^2+m^2} \\ &= \int \frac{d^4k}{(2\pi)^4} \frac{e^{ik(x-y)}}{k^2+m^2+2ik^0\epsilon} \\ &= \int \frac{d^4k}{(2\pi)^4} \frac{e^{ik(x-y)}}{k^2+m^2+i\,\mathrm{sign}(k^0)\epsilon}\,, \end{aligned} \tag{8.23}$$

where the last line follows because only the sign of the infinitesimal term matters (and not its magnitude). Similarly,

$$\Delta_{\rm adv}(x-y) = \int \frac{d^4k}{(2\pi)^4} \frac{e^{ik(x-y)}}{k^2+m^2-i\,\mathrm{sign}(k^0)\epsilon}\,. \tag{8.24}$$

2.

From the Srednicki solution manual:

(a)

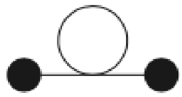
The vertex joins four line segments. The vertex factor is $4!(\mathrm{i})(-\lambda/24) = -\mathrm{i}\lambda$.

(b)

$E = 2,\ V = 0$:

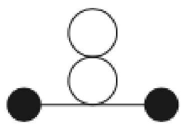
$S = 2$

$E = 2,\ V = 1$:

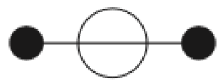


$S = 2^2$

$E = 2,\ V = 2$:



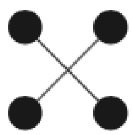
$S = 2^3$



$S = 2 \times 3!$

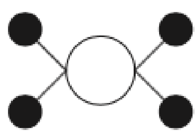
$S = 2^3$

$E = 4,\ V = 1$:

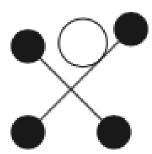


$S = 4!$

$E = 4,\ V = 2$:



$S = 2^4$



$S = 2 \times 3!$