Equation 3.29

First equaiton
The commutation relation is

$$\begin{aligned}
&[\gamma^\mu, S^{\rho\sigma}] = \tfrac{i}{4}\left[\gamma^\mu, [\gamma^\rho, \gamma^\sigma]\right] \\
&= \tfrac{i}{4}\left[\gamma^\mu, \gamma^\rho\gamma^\sigma - \gamma^\sigma\gamma^\rho\right] \\
&= \tfrac{i}{4}\left[\gamma^\mu\gamma^\rho\gamma^\sigma - \gamma^\mu\gamma^\sigma\gamma^\rho - \gamma^\rho\gamma^\sigma\gamma^\mu + \gamma^\sigma\gamma^\rho\gamma^\mu\right] \\
&= \tfrac{i}{4}\left[\gamma^\mu\gamma^\rho\gamma^\sigma - \gamma^\mu\gamma^\sigma\gamma^\rho - \gamma^\rho(2g^{\sigma\mu} - \gamma^\mu\gamma^\sigma) + \gamma^\sigma(2g^{\rho\mu} - \gamma^\mu\gamma^\rho)\right] \\
&= \tfrac{i}{4}\left[\gamma^\mu\gamma^\rho\gamma^\sigma - \gamma^\mu\gamma^\sigma\gamma^\rho - 2g^{\sigma\mu}\gamma^\rho + 2g^{\rho\mu}\gamma^\sigma + \gamma^\rho\gamma^\mu\gamma^\sigma - \gamma^\sigma\gamma^\mu\gamma^\rho\right] \\
&= \tfrac{i}{4}\left[\gamma^\mu\gamma^\rho\gamma^\sigma - \gamma^\mu\gamma^\sigma\gamma^\rho - 2g^{\sigma\mu}\gamma^\rho + 2g^{\rho\mu}\gamma^\sigma + (2g^{\rho\mu} - \gamma^\mu\gamma^\rho)\gamma^\sigma - (2g^{\sigma\mu} - \gamma^\mu\gamma^\sigma)\gamma^\rho\right] \\
&= \tfrac{i}{4}\left[\gamma^\mu\gamma^\rho\gamma^\sigma - \gamma^\mu\gamma^\sigma\gamma^\rho - 2g^{\sigma\mu}\gamma^\rho + 2g^{\rho\mu}\gamma^\sigma + 2g^{\rho\mu}\gamma^\sigma - 2g^{\sigma\mu}\gamma^\rho - \gamma^\mu\gamma^\rho\gamma^\sigma + \gamma^\mu\gamma^\sigma\gamma^\rho\right] \\
&= \tfrac{i}{4}\left[4g^{\rho\mu}\gamma^\sigma - 4g^{\sigma\mu}\gamma^\rho\right] \\
&= i(g^{\rho\mu}\gamma^\sigma - g^{\sigma\mu}\gamma^\rho)
\end{aligned} \tag{1}$$

The righthand side is

$$\begin{aligned}
&(\mathcal{J}^{\rho\sigma})^\mu_{\ \nu}\gamma^\nu = g^{\mu\alpha}(\mathcal{J}^{\rho\sigma})_{\alpha\nu}\gamma^\nu = g^{\mu\alpha} i(\delta^\rho_\alpha\delta^\sigma_\nu - \delta^\rho_\nu\delta^\sigma_\alpha)\gamma^\nu \\
&= ig^{\mu\alpha}(\delta^\rho_\alpha\gamma^\sigma - \delta^\sigma_\alpha\gamma^\rho) = i(g^{\mu\rho}\gamma^\sigma - g^{\mu\sigma}\gamma^\rho) \\
&= i(g^{\rho\mu}\gamma^\sigma - g^{\sigma\mu}\gamma^\rho)
\end{aligned} \tag{2}$$

Second equation
Lefthand side

$$\begin{aligned}
&\left(\gamma^\mu + \tfrac{1}{2}\omega_{\rho\sigma}S^{\rho\sigma}\gamma^\mu\right)\left(1 - \tfrac{1}{2}\omega_{\rho\sigma}S^{\rho\sigma}\right) \simeq \gamma^\mu + \tfrac{1}{2}\omega_{\rho\sigma}S^{\rho\sigma}\gamma^\mu - \tfrac{1}{2}\omega_{\rho\sigma}\gamma^\mu S^{\rho\sigma} \\
&= \gamma^\mu - \tfrac{1}{2}\omega_{\rho\sigma}\left[\gamma^\mu, S^{\rho\sigma}\right]
\end{aligned} \tag{3}$$

Righthand side

$$\gamma^\mu - \frac{1}{2}\omega_{\rho\sigma}(\mathcal{J}^{\rho\sigma})^\mu_{\ \nu}\gamma^\nu \tag{4}$$