

$$\begin{aligned}
 \text{a) } \int_{-1}^1 \int_0^2 x^2 y + y^2 x + 1 \, dx dy &= \int_{-1}^1 \left(\frac{x^3}{3} y + y^2 \frac{x^2}{2} + x \right) \Big|_0^2 dy \\
 &= \int_{-1}^1 \left(\frac{8}{3} y + 2y^2 + 2 \right) dy = \left(\frac{8}{3} \frac{y^2}{2} + \frac{2}{3} y^3 + 2y \right) \Big|_{-1}^1 \\
 &= 0 + \frac{2}{3} \cdot 2 + 2 \cdot 2 = \frac{4}{3} + 4 = \frac{4+12}{3} = \boxed{\frac{16}{3}}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } \int_0^1 \int_{-x}^x y+1 \, dy dx &= \int_0^1 \left(\frac{y^2}{2} + y \right) \Big|_{-x}^x dx = \int_0^1 0 + 2x \, dx \\
 &= x^2 \Big|_0^1 = \boxed{1}
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } \int_0^2 \int_{y^2}^4 2ye^x \, dx dy &= \int_0^2 2ye^x \Big|_{y^2}^4 dy = \int_0^2 2ye^4 - 2ye^{y^2} dy \\
 &= 2e^4 \frac{y^2}{2} - 2 \left(\frac{e^{y^2}}{2} \right) \Big|_0^2 = 4e^4 - e^4 + 1 = \boxed{3e^4 + 1}
 \end{aligned}$$