1. Compute the integral of \( f(x, y) = x + y \) over the region in the first quadrant between the graphs of \( y = x \) and \( y = x^2 \).

\[
\int_0^1 \int_{x^2}^x (x + y) \, dy \, dx
= \int_0^1 x y + \frac{y^2}{2} \bigg|_{y=x^2}^{y=x} \, dx
= \int_0^1 x^2 + \frac{x^2}{2} - x^3 - \frac{x^4}{2} \, dx
= \int_0^1 \frac{3}{2} x^2 - x^3 - \frac{x^4}{2} \, dx = \left. \frac{x^3}{2} - \frac{x^4}{4} - \frac{x^5}{10} \right|_0^1
= \frac{1}{2} - \frac{1}{4} - \frac{1}{10} = \frac{1}{4} - \frac{1}{5} = \frac{3}{20}
\]

2. Change the order of integration, then compute the integral

\[
\int_0^4 \int_{x^2}^4 x \, dy \, dx
= \int_0^4 \int_0^{\sqrt{y}} x \, dx \, dy
= \frac{1}{2} \int_0^4 x^2 \bigg|_0^{\sqrt{y}} \, dy = \frac{1}{2} \int_0^4 y e^{y^2} \, dy
= \frac{1}{4} \int_0^{16} e^u \, du = \frac{1}{4} e^u \bigg|_0^{16}
= \frac{1}{4} (e^{16} - 1)
\]