1. Sketch the domain of integration $D$ and evaluate the integral.

a) $\int \int_D xy \, dA$, where $D$ is the region enclosed by the lines $x = 1$, $y = 0$, $x = y$.

Answer: $1/8$.

b) $\int \int_D (x^2 + y) \, dA$, where $D$ is the region enclosed by the curves $x = y^2$, $y = x^2$.

\[ \text{Answer: } \frac{33}{140} \]

c) $\int \int_D e^{xy} \, dA$, where $D$ is the region enclosed by the curves $x = 0$, $y = 1$, $x = y^2$.

\[ \text{Answer: } \frac{1}{12} \]

d) $\int \int_D (1 + x + y) \, dA$, where $D$ is the region defined by the inequalities $|x| \leq 2$, $|y| \leq 2$, $x^2 + y^2 \geq 1$.

\[ \text{Answer: } 16 - \pi \]
2. Sketch the domain of integration and change the order of integration.

a) $\int_{0}^{12} \int_{3x^2}^{12x} f(x, y) \, dy \, dx$

b) $\int_{1}^{2} \int_{\frac{1}{x}}^{\frac{1}{2}} f(x, y) \, dy \, dx$

c) $\int_{0}^{1} \int_{0}^{1} f(x, y) \, dx \, dy + \int_{1}^{2} \int_{0}^{\frac{1}{\sqrt{y-1}}} f(x, y) \, dx \, dy$