1. Evaluate $\int_0^1 \int_{x-1}^0 \frac{2y}{x+1} \, dy \, dx$

2. Evaluate $\int\!\int_D \, dA$, where $D = \{(x, y) | 1 \leq y \leq 2, y \leq x \leq y^3\}$ \hspace{1cm} \left(\frac{9}{4}\right)

3. Evaluate $\int\!\int_D \frac{1}{x} \, dA$, where $D = \{(x, y) | 1 \leq y \leq e, y^2 \leq x \leq y^4\}$ \hspace{1cm} (2)

4. Evaluate $\int\!\int_D x \cos y \, dA$, where $D$ is bounded by $y = 0, y = x^2, x = 1$ \hspace{1cm} \left(\frac{1-\cos 1}{2}\right)$

5. * Evaluate $\int\!\int_D 4y^3 \, dA$, where $D$ is bounded by $y = x - 6, y^2 = x$ \hspace{1cm} \left(\frac{500}{3}\right)$

6. Find the volume of the solid under the paraboloid $z = x^2 + y^2$ and above the region bounded by $y = x^2$ and $x = y^2$. \hspace{1cm} (\frac{6}{5})

7. Find the volume of the solid bounded by the cylinder $x^2 + z^2 = 9$ and the planes $x = 0, y = 0, z = 0, x + 2y = 2$ in the first octant. \hspace{1cm} \left(\frac{1}{6}(11\sqrt{5} - 27)\right)$

8. Find the volume of the solid bounded by the cylinders $x^2 + y^2 = r^2$ and $y^2 + z^2 = r^2$.

9. Sketch the region of integration and change the order of integration:

(a) $\int_0^{\pi/2} \int_0^{\sin x} f(x, y) \, dy \, dx$

(b) $\int_1^2 \int_0^{\ln x} f(x, y) \, dy \, dx$

(c) $\int_0^1 \int_0^{2-y} f(x, y) \, dx \, dy$

(d) $\int_0^{\pi/4} \int_{\arctan x}^1 f(x, y) \, dy \, dx$

10. Evaluate the integrals by reversing the order of integration

(a) $\int_0^1 \int_{3y}^3 e^{x^2} \, dx \, dy$ \hspace{1cm} \left(\frac{e^9 - 1}{6}\right)$

(b) $\int_0^3 \int_{y^2}^9 y \cos(x^2) \, dx \, dy$ \hspace{1cm} \left(\frac{1}{4} \sin 81\right)$

(c) * $\int_0^1 \int_{\arcsin y}^{\pi/2} \cos x \sqrt{1 + \cos^2 x} \, dx \, dy$ \hspace{1cm} \left(\frac{2\sqrt{2} - 1}{3}\right)$

(d) $\int_0^2 \int_{\sqrt{y}}^1 e^x \, dx \, dy$

11. * Evaluate $\int\!\int_D xy \, dA$, where $D$ is bounded by $x = -1, y = 1 + x^2, x = 1, x = y^2, y = -1$