1. Evaluate $\int_{\Omega}\int e^{y^2}\,dxdy$ where Ω is the triangular region bounded by the y-axis, the line $y = 1$, and the line $y = \frac{1}{2}x$.

2. Evaluate $\int_{\Omega}\int \sin(x^2 + y^2)\,dxdy$ where Ω is the annular region between the circles $x^2 + y^2 = \frac{\pi}{2}$ and $x^2 + y^2 = \pi$.

3. Evaluate $\int_{-2}^{2}\int_{0}^{\sqrt{4-y^2}} \frac{1}{1 + x^2 + y^2}\,dx\,dy.$

4. Evaluate $\int_{0}^{9}\int_{\sqrt{y}}^{3} \sin(\pi x^3)\,dx\,dy.$

5. Evaluate $\int_{0}^{2}\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}\int_{0}^{\sqrt{4-x^2-y^2}} dz\,dy\,dx$

6. Given $\int_{0}^{1}\int_{0}^{2}\int_{0}^{4-y^2} f(x, y, z)\,dz\,dy\,dx.$ An equivalent repeated integral in the order $dy\,dx\,dz$ is:

7. Given $\int_{-3}^{3}\int_{-\sqrt{9-x^2}}^{\sqrt{9-x^2}}\int_{0}^{\sqrt{9-x^2-y^2}} \frac{1}{\sqrt{x^2 + y^2}}\,dz\,dy\,dx.$ An equivalent repeated integral in cylindrical coordinates is

8. Let T by the solid bounded below by the half-cone $z = \sqrt{x^2 + y^2}$ and above by the spherical surface $x^2 + y^2 + z^2 = 25$. Evaluate the (improper) integral:

$$\iiint_T \frac{1}{(x^2 + y^2 + z^2)}\mathrm{dx}\,\mathrm{dy}\,\mathrm{dz} \tag{1}$$