Change-of-variables Formula for Spherical Coordinates

Use the Jacobian change-of-variables formula for triple integrals, given by

$$dx\,dy\,dz = \left|\det\begin{pmatrix} \partial x/\partial r & \partial x/\partial\theta & \partial x/\partial\phi \\ \partial y/\partial r & \partial y/\partial\theta & \partial y/\partial\phi \\ \partial z/\partial r & \partial z/\partial\theta & \partial z/\partial\phi \end{pmatrix}\right| dr\,d\theta\,d\phi,$$

to derive $dx\,dy\,dz = r^2\sin\theta\,dr\,d\theta\,d\phi$.

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