26. Using the projection on the $yz$ plane we can evaluate the integral as follows:

\[
\iiint_E z\,dV = \int_0^1 \int_0^{\sqrt{1-y^2}} \int_0^{2-y} z\,dx\,dz\,dy
\]

\[=
\int_0^1 \int_0^{\sqrt{1-y^2}} (2-y)z\,dz\,dy\]

\[=
\int_0^1 \frac{1}{2} (2-y)(1-y^2) dy\]

\[=
\int_0^1 \frac{1}{2} (2-y - 2y^2 + y^3) dy = \frac{13}{14}
\]

28. Using spherical coordinates we have that $0 \leq \rho \leq 1$ (since the solid is bounded by the sphere of radius 1), $0 \leq \phi \leq \frac{\pi}{2}$ (since the solid lies above the $xy$ plane) and $0 \leq \theta \leq 2\pi$. Thus

\[
\iiint_H z^3 \sqrt{x^2 + y^2 + z^2} \,dV = \int_0^\frac{2\pi}{\rho} \int_0^{\pi/2} \int_0^1 (\rho^3 \cos^3 \phi) \rho (\rho^2 \sin \phi) \,d\rho\,d\phi\,d\theta
\]

\[=
\int_0^\frac{2\pi}{\rho} d\theta \int_0^{\pi/2} \cos^3 \phi \sin \phi \,d\phi \int_0^1 \rho^6 \,d\rho = 2\pi \left[-\frac{1}{4} \cos^4 \phi \right]_0^{\pi/2} \left(\frac{1}{7} \right) = \frac{\pi}{14}
\]

32. The $xy$ projection of the solid is the disk of radius 2 centered at the origin. In cylindrical coordinates the plane $y + z = 3$ has equation $z = 3 - r \cos \theta$. Thus the volume is given by

\[
V = \iiint_E dV = \int_0^{2\pi} \int_0^2 \int_0^{3-r \sin \theta} r \,dz\,dr\,d\theta
\]

\[=
\int_0^{2\pi} \int_0^2 (3r - r^2 \sin \theta) \,dr\,d\theta
\]

\[=
\int_0^{2\pi} [6 - \frac{8}{3} \sin \theta] \,d\theta = 6\theta|_{0}^{2\pi} + 0 = 12\pi
\]

34. The paraboloid and the half-cone intersect when $x^2 + y^2 = \sqrt{x^2 + y^2}$, that is when $x^2 + y^2 = 1$. Thus the projection of the solid on the $xy$ plane is a circle of radius 1. In cylindrical coordinates, the equation of the paraboloid is $z = r^2$ and the equation of the cone is $z = r$ and the volume is given by

\[
V = \iiint_E dV = \int_0^{2\pi} \int_0^1 \int_{r}^{r^2} r\,dz\,dr\,d\theta = \int_0^{2\pi} \int_0^1 (r^2 - r^3) \,dr\,d\theta
\]

\[=
\int_0^{2\pi} (\frac{1}{4} - \frac{1}{4}) \,d\theta = \frac{1}{12} (2\pi) = \frac{\pi}{6}
\]

42. (a) The surface is a vertical plane at an angle of $\frac{\pi}{4}$ with the positive $x$-axis. In cartesian coordinates, the plane has equation $y = x$.

(b) The surface is a cone at an angle of $\frac{\pi}{4}$ radians with the positive $z$-axis. In cartesian coordinates the cone has equation $z = \sqrt{x^2 + y^2}$.  

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