# Advanced Calculus
# MA1132
# Tutorial Exercises 10

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**To be completed before and during tutorials of Friday, 12. April**

1. Use cylindrical coordinates to find the volume of the solid that that is inside the surface $r^2 + z^2 = 20$ but is not above the surface $z = r^2$.

2. Use spherical coordinates to find the volume of the solid enclosed by the sphere $x^2 + y^2 + z^2 = 4$ and the planes $z = 0$ and $z = 1$.

3. Use the transformation $u = \dfrac{y}{x}$, $v = xy$ to find $\iint_R xy^3\,dA$, where $R$ is the region is the region in the first quadrant enclosed by $y = x$, $y = 3x$, $xy = 1$ and $xy = 4$.

4. Use the transformation $u = xy$, $v = yz$, $w = xz$ to find the volume of the region in the first octant that is enclosed by the hyperbolic cylinders $xy = 1$, $xy = 2$, $yz = 1$, $yz = 3$, $xz = 1$ and $xz = 4$.