

1. **(5 points)** Calculate the integral  $\iiint_E y dV$ , where  $E$  is bounded by the planes  $x = 0$ ,  $y = 0$ ,  $y = 1$ ,  $z = 0$ , and  $2x + z = 4$ .
2. **(5 points)** Set up (but do not evaluate) a cylindrical form for the integral  $\iiint_E (x + 1) dV$  over the solid which lies below the paraboloid  $z = 8 - x^2 - y^2$  and above the paraboloid  $z = x^2 + y^2$ .
3. **(5 points)** Set up (but do not evaluate) a spherical integral to calculate the volume lying between the cones  $z^2 = x^2 + y^2$  and  $z^2 = 3x^2 + 3y^2$  for  $z \geq 0$ , and bounded above by the sphere  $x^2 + y^2 + z^2 = 16$ .
4. **(5 points)** Let the region  $D$  be bounded by the curves  $xy = 1$ ,  $xy = 4$ ,  $y = 4x$ , and  $y = 9x$  in the first quadrant. Use the transformations  $x = \frac{u}{v}$  and  $y = uv$  to compute the area of  $D$ .