

Surface integral with respect to area

1. Evaluate  $\int_S 6xy d\sigma$  if  $S$  is the portion of the plane  $x + y + z = 1$  in the first octant.
2. Evaluate  $\int_S (z^2 + 2x^2 + 2y^2) d\sigma$  if  $S$  the portion of the cone  $z^2 = x^2 + y^2$ ,  $z \geq 0$  cut by the cylinder  $x^2 + y^2 = 1$ .
3. Evaluate  $\int_S \frac{y}{\sqrt{z}} d\sigma$  if  $S$  is the portion of the paraboloid of revolution  $2z = x^2 + y^2$ , where  $x \geq 0$ ,  $y \geq 0$  and  $0 \leq z \leq 1$ .
4. Evaluate the area of the portion of the paraboloid of revolution  $z = x^2 + y^2$  under the plane  $z = 4$ .

Surface integral with respect to coordinates

5. Evaluate  $\int_S (x^2 + y^2) dx dy$  if  $S$  is the lower side of the plane  $z = 0$  bounded by the circle  $x^2 + y^2 = R^2$ .
6. Evaluate  $\int_S z^2 dx dy$  if  $S$  is the upper side of the portion of cone  $x^2 + y^2 = z^2$  between the planes  $z = 0$  and  $z = 1$ .
7. Evaluate  $\int_S x^2 dy dz + y^2 dx dz + z^2 dx dy$  if  $S$  is the outer side of cube  $0 \leq x \leq 1, 0 \leq y \leq 1, 0 \leq z \leq 1$ .