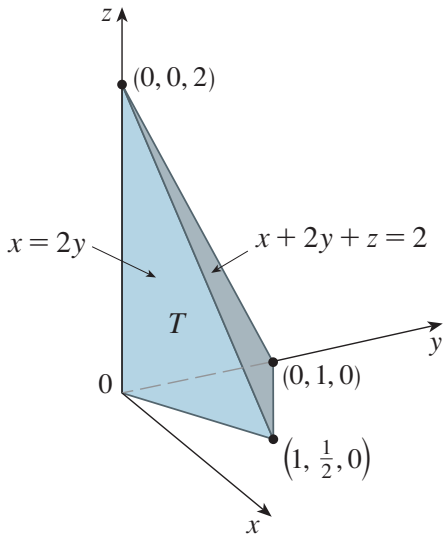
Sections 12.2 & 12.3 - Iterated Integrals and Double Integrals over General Regions

1. Evaluate the integral of $f(x, y) = x + y$ over the region bounded by $y = \sqrt{x}$ and $y = x^2$.
2. Evaluate the integral of $f(x, y) = x + y$ over the region bounded by $y = x$ and $y = x^2$.
3. $\iint_R 6x^2 - 10y \, dA$, where R is the triangle with vertices $(0, 3)$, $(1, 1)$, and $(5, 3)$.
4. Write down the double integral $\iint_R y^2 e^{xy} \, dA$ as an iterated integral, where R is given by $0 \leq y \leq 3$ and $y \leq x \leq 5$.
5. Use a double integral to calculate the area of the region bounded by the curves $y = x^2 - 4$ and $y = 2x + 4$.
6. Find the volume of the tetrahedron bounded by the planes $x + 2y + z = 2$, $x = 2y$, $x = 0$, and $z = 0$.



Section 12.4 - Doubles Integrals in Polar Coordinates

Evaluate the following integrals.

7. $\iint_R 2xy \, dA$, R is the portion of the region between the circles of radius 2 and radius 5 centered at the origin that lies in the first quadrant.
8. $\iint_D e^{x^2+y^2} \, dA$, D is the unit disk centered at the origin.
9. $\int_0^1 \int_0^{\sqrt{1-y^2}} \cos(x^2 + y^2) \, dx \, dy$
10. $\int_0^2 \int_0^{\sqrt{2y-y^2}} 1 \, dx \, dy$
11. $\int_0^{\sqrt{2}} \int_x^{\sqrt{4-x^2}} 3x \, dy \, dx$

Section 12.5 - Applications of Doubles Integrals (Density and Mass)

12. Find the mass of a thin metal plate which occupies the region R inside the square with vertices $(1,1), (2,1), (1,2)$, and $(2,2)$, if the density of the region r is given by $\delta(x,y) = x^2 + y^2\,\text{kg/m}^2$. Here, x and y are in meters.

13. Find the mass of a thin metal plate which occupies the region R in the first quadrant inside the circle of radius 2, and outside the circle of radius 1, both centered at the origin. The density of the region R is given by $\delta(x,y) = x^2 + y^2\,\text{kg/m}^2$. Here, x and y are in meters.