

1. Find the area of the region enclosed by  $y = x^3$ ,  $y = 4x^3$ ,  $x = y^3$ ,  $x = 4y^3$  in the first quadrant.

2. Evaluate  $\int_C ye^{x^2} ds$ , where  $C$  is the curve  $\vec{r}(t) = 4t\vec{i} - 3t\vec{j}$ , for  $-1 \leq t \leq 2$ .

3. Find the work done by the force field  $\mathbf{F} = 2y\vec{i} + 3x\vec{j} + (x + y)\vec{k}$  in moving an object along the curve

$$\vec{r}(t) = (\cos t)\vec{i} + (\sin t)\vec{j} + \left(\frac{t}{6}\right)\vec{k}, \quad 0 \leq t \leq 2\pi.$$

4. Find the circulation and flux of the field  $\mathbf{F} = (x + y)\vec{i} - (x^2 + y^2)\vec{j}$  around and across the triangle with vertices  $(1,0)$ ,  $(0,1)$ ,  $(-1,0)$ .