(1) Evaluate the integral $\int\int_D \sqrt{x+2y}\sin(y-2x)dxdy$, where D is the region bounded by the four lines $y=2x$, $y=2x+\frac{\pi}{2}$, $x+2y=1$ and $x+2y=9$.

(2) Consider the surface that is the part of the paraboloid $z=x^2+y^2+5$ with $x\geq 0$ and $y\geq 0$, located between the planes $z=0$ and $z=9$. Evaluate the scalar surface integral $\int\int \sqrt{1+4x^2+4y^2}\,dS$ over this surface.

(3) Find the outward flux of the vector field $\mathbf{F}(x,y,z)=(3xz^2,y,-z^3)$ across the surface of the solid in the first octant that is bounded by the surface $x^2+4y^2=16$ and the planes $y=2z$, $x=0$, and $z=0$.

(4) Find the area of the part of the graph of the function $f(x,y)=xy$ that is outside the cylinder $x^2+y^2=1$ and inside $x^2+y^2=9$.

(5) Find the centroid of the region $\{(x,y): x^2+y^2\leq 1,\ x\geq 0,\ y\geq 0\}$ shaped like one fourth of a disk.

(6) Find the area of the region enclosed by the curve $\mathbf{x}(t)=(t^2,\frac{t^3}{3}-t)$, $-\sqrt{3}\leq t\leq\sqrt{3}$.

(7) The force $\mathbf{F}(x,y)=(y\cos x-y^3,\sin x-3xy^2)$ acts on a particle as it moves from the point $(0,0)$ to the point $(1,1)$, first along the horizontal line segment from $(0,0)$ to $(1,0)$, and then along the vertical line segment from $(1,0)$ to $(1,1)$. Find the work done.

(8) Let C be the curve in the xy-plane consisting of the four sides of the square $\{(x,y): |x|\leq 1,|y|\leq 1\}$ oriented clockwise. Compute $\oint_C (y^2+z^2)\,dx+(x^2+y^2)\,dy+(x^2+y^2)\,dz$.