① Consider the function $f(x,y) = 2x^2+4y^2$.

a) Use the Lagrange multipliers to determine the absolute max and min of f on the ellipse $x^2+6y^2=24$

b) Explain why the function f above has an absolute max and an absolute min on the elliptical disk $x^2+6y^2 \le 24$

c) Find the absolute max and min of f above on the elliptical disk $x^2+6y^2 \le 24$. (Hint: you may use a) above.)

② Same questions for $f(x,y) = 2x+4y$. on $x^2+6y^2 = \frac{5}{3}$

③ Find the area of the piece of the parabolic surface $z = 3x^2+3y^2$ which lies inside the cylindrical shell $1 \le x^2+y^2 \le 2$

④ Use a double integral to calculate the area enclosed by the parabolas $x = 10-y^2$ and $x = 14-2y^2$.

⑤ Use a double integral to calculate the area enclosed by the circles $x^2+y^2-2x=0$ and $x^2+y^2=1$

⑥ Set up iterated integrals to calculate $\iiint_V f(x,y,z)\,dV$ where V is the solid tetrahedron $x \ge 0, y \ge 0, z \ge 0, x+y+z \le 1$.

⑦ (like problem 19) Use a $\iiint$ to find the volume of the solid enclosed by the cylinder $x^2+z^2=9$ and the planes $y=1$ and $y+z=5$

⑧ (like example 5)
Find the mass of the solid of constant density ρ bounded by the parabolic cylinder $x=y^2$ and the planes $x=z$, $z=0$, $x=1$.

⑨..⑤⓪ Solve many other problems from the textbook.