1. Let \( \mathbf{r}(t) = (t, t^2, t^3) \). Find normal plane at point \( t = 2 \).
2. Find the equation of the plane containing the points \((1, 1, 1), (1, 1, -1)\) and \((-1, 2, 2)\).

3. Find the area of the parallelogram generated by the vectors \((2, 1, -1)\) and \((-1, 1, 2)\).
4. Let \( f(x, y) = x \cos(y) - \frac{y}{x} \). Find all second partial derivatives: \( f''_{xx}, f''_{xy}, f''_{yy} \).

5. Find local maximum, minimum and saddle points (if any) of the function 
\[ f(x, y) = x^2 - 2xy - y^2 + 4x - 1. \]
6. Let $z = e^{x^2} y + \frac{1}{y}$. Find equation of the tangent plane at point $(0, 1)$.

7. Find the maximum rate of change of $f(x, y) = x^3 - \sqrt{xy}$ at the point $(1, 1)$. In which direction does it occur?
8. Find the area of the region $D$ bounded by $x = y^4$ and $y = x/8$.

9. Sketch the region of integration and change the order of integration:

$$\int_0^1 \int_x^{x^2+1} f(x, y) dy dx.$$
10. Find the volume under the surface \( z = x + y + 2 \) and above the disc \( x^2 + y^2 \leq 1 \) in the \( xy \) plane. Use polar coordinates.

11. Acceleration of the particle is given by \( \mathbf{a} = (-1, 0, 1) \). Find velocity and position of the particle as functions of time if at time \( t = 0 \) we have \( \mathbf{v}(0) = (1, 0, 0) \) and \( \mathbf{r}(0) = (1, 1, 1) \).
12. Find the absolute maximum and absolute minimum of the function $f(x, y) = x^2 - y^2 - 2x + 1$ on the region $0 \leq x \leq 2, \ 0 \leq y \leq 1$. Be sure to provide coordinates of the points and the values of absolute maximum and minimum.
13. Using spherical coordinates, calculate the integral \[ \iiint_V z^2 \, dxdydz \], where the region 
\( V \) is the half-ball: \( \{x^2 + y^2 + z^2 \leq 4, \, x \geq 0\} \).
14. Calculate the integral

$$\int \int_D (x + y) \, dA,$$

where the region $D$ is bounded by the lines $x + y = 1$, $x + y = 2$, $x - y = 0$, $x - y = 2$. Use the change of variables $u = x + y$, $v = x - y$. 