Problem 1. Fill in the blank.

(a) The graph of a linear function is a ________________.

(b) The level curves of a linear function are ________________.

(c) The function \( f(x, y, z) = 15 + xy + z \) is ________________.

(d) The set of points \((x, y)\) such that \((x + 3)^2 + (y - 1)^2 = 4\) is a ________________.

(e) The \(z\)-coordinate of a point is its ________________ above the \(xy\)-plane.

Problem 2. Find the value of \(k\) such that \((2, k)\) is equidistant from \((0,0)\) and \((-1, 2)\).
Problem 3. For $z = f(x, y) = 3y^2 - 2x^2$, find the equation of the cross section at $y = 1$ and give a description of this curve.

Problem 4. For $f(x, y) = \ln(x^2y + x)$, compute the partial derivatives $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}$.

Problem 5. For $f(x, y) = x^2y^4 + 5y^2 - e^{x^2y} - 7$, compute the partial derivatives $\frac{\partial^2 f}{\partial x^2}, \frac{\partial^2 f}{\partial y^2}, \frac{\partial^2 f}{\partial x \partial y}$.
Problem 6. Find all relative extreme values of $f(x, y, z) = x^3 + x^2 - x + y^2 - y + z^2 - z - 1$ subject to $x + y + z = 0$. Use substitution to find and classify the critical points.