

Study guide for quiz 06

Quiz problems include both the lecture contents and homework problems.

1. Section 14.6: Review the definition and properties of the gradient vector and its application in finding the tangent plane and normal line at a point $P_0(x_0, y_0, z_0)$ on the level surface $f(x, y, z) = c$ of a differentiable function f .
2. Section 14.6: Study and memorize the error estimate of $E(x, y) = f(x, y) - L(x, y)$ for a function $z = f(x, y)$ and its linearization $z = L(x, y)$ at a point (x_0, y_0) . Generalize the result to functions of more than two variables (such as $w = f(x, y, z)$).
3. Section 14.7: Study the 'First Derivative Test', 'Second Derivative Test', how the sign of the determinant $f_{xx}f_{yy} - f_{xy}^2$ is related to whether $f_{xx}\Delta x^2 + 2f_{xy}\Delta x\Delta y + f_{yy}\Delta y^2$ can be rewritten as 'sum of squares' or 'difference of squares', which in turn determines whether a critical point is local min, local max, or neither. Review the procedure of finding potential local minima and/or local maxima of a differentiable function $z = f(x, y)$.