

Quiz 5

This is a two-stage quiz. During the first stage, use your knowledge & calculator to take this quiz. You have 15 min. In the second stage. You are now welcome to use your books, notes, and others in the class to retake the same quiz in the remaining half hour. One copy from each group of 2 to 3 people must be turned in.

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. Given that g is a differentiable function with $g(6, 3) = 5$, $g_x(6, 3) = 1$, and $g_y(6, 3) = -1$.

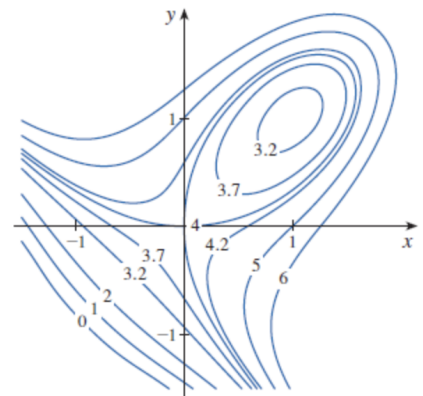
(a) [3] Find the local linearization of g when $x = 6$ and $y = 3$.

(b) [1] Approximate $g(6.2, 2.9)$ using tangent planes.

2. Consider the function $f(x, y) = 4 + x^3 + y^3 - 3xy$ whose contour curves are shown below.

(a) [2] Sketch the gradient vector at the point $(1, 0)$.

$$f(x, y) = 4 + x^3 + y^3 - 3xy$$



(b) [2] Identify a critical point on the graph of f that is not a local minimum or maximum.

(c) [2] Find the directional derivative of f at $(1, 0)$ in the direction of $\vec{u} = \frac{1}{\sqrt{2}}\vec{i} - \frac{1}{\sqrt{2}}\vec{j}$