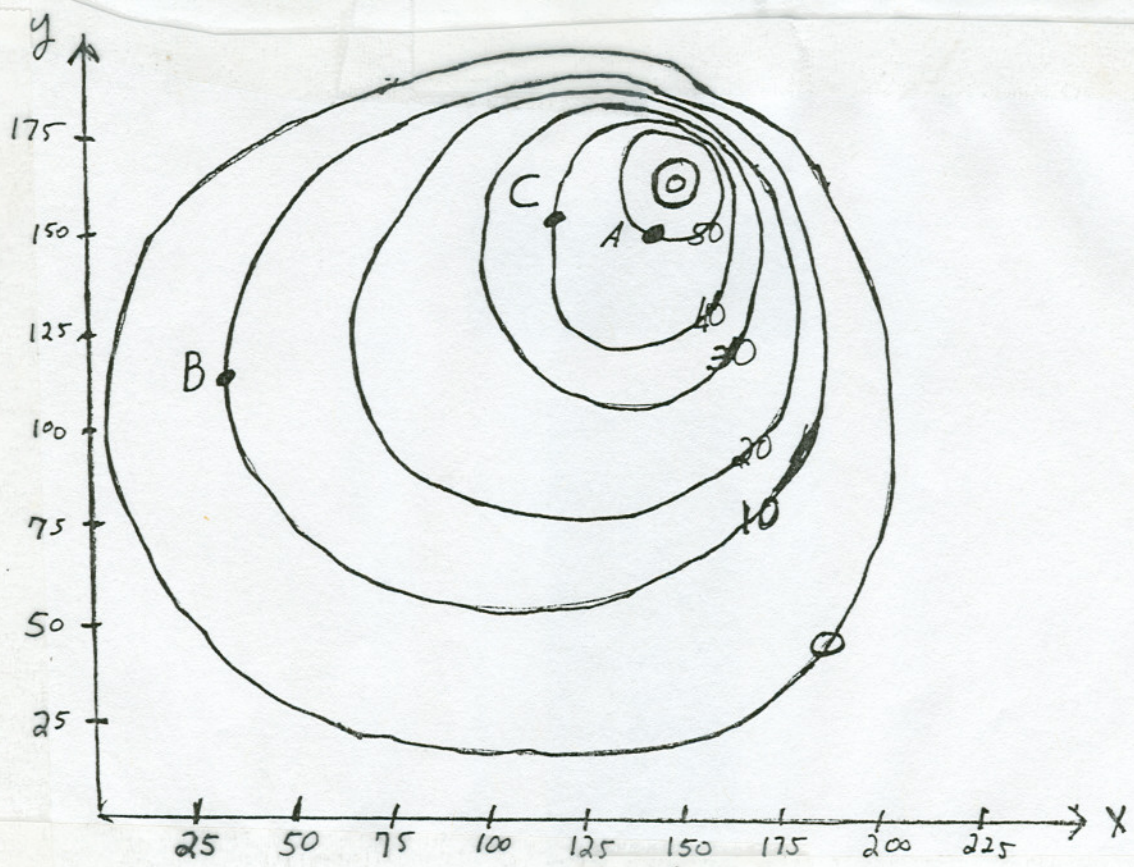


7. The picture shows the contour map for a hill 70 feet high, which we assume has the equation $z = f(x, y)$.



- (a) A raindrop landing on the hill at point A will reach the xy -plane at A' , by following the path of steepest descent from A . Draw the path from A to A' .
 - (b) What are the coordinates of the point A' ?
 - (c) Estimate f_x at the point B .
 - (d) Estimate f_y at the point B .
 - (e) Estimate $D_{\vec{u}}f$ at the point C , where $\vec{u} = \frac{\vec{i} + \vec{j}}{\sqrt{2}}$.
8. Find $D_{\vec{u}}f(1, 4)$, where $f(x, y) = y^2 \ln x$ and $\vec{u} = \frac{(\vec{i} - \vec{j})}{\sqrt{2}}$.
9. Find the equation of the plane tangent to $x^2 + y^2 + z^2 = 16$ at $(2, 3, \sqrt{3})$.
10. If the temperature of a plate at the point (x, y) is $T(x, y) = 10 + 2x^2 - y^2$, then find the path a heat-seeking particle (which always moves in the direction of greatest increase of temperature) would follow if it starts at $(4, 2)$.