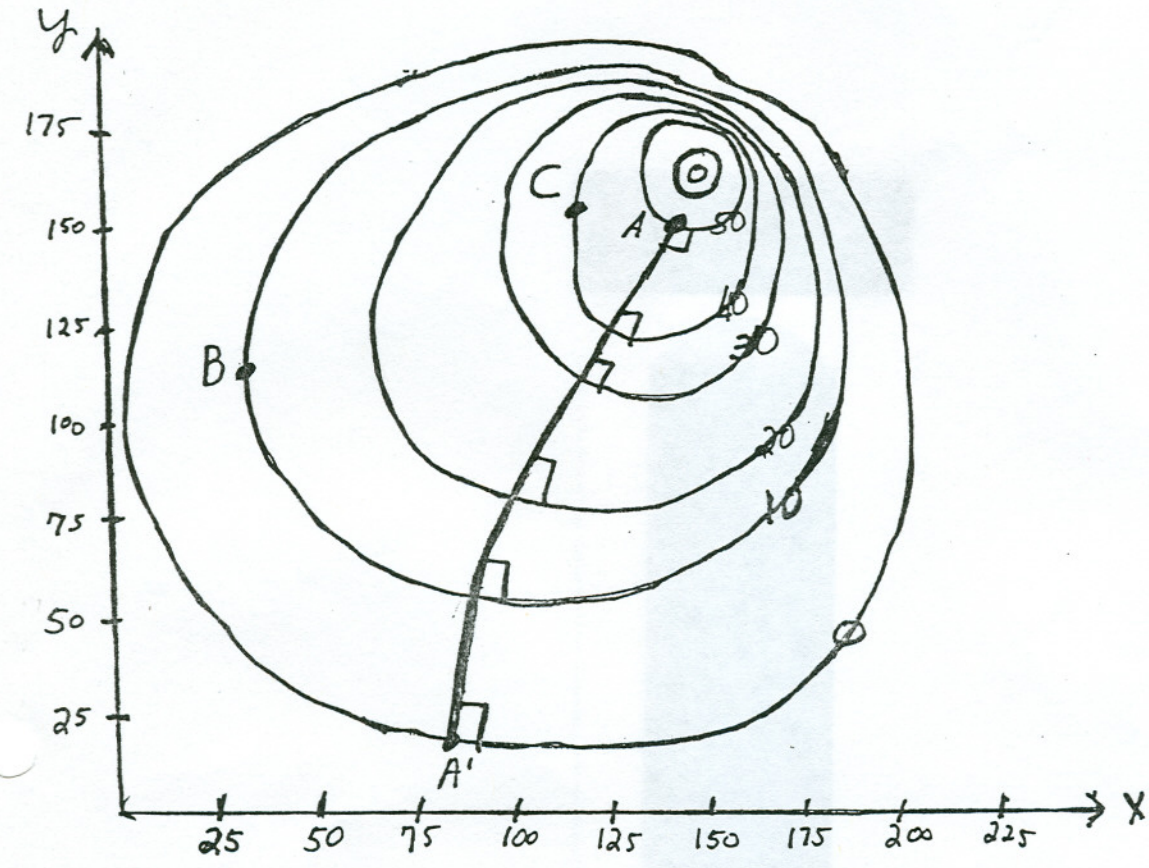
7. The picture shows the contour map for a hill 70 feet high, which we assume has the equation $z = f(x, y)$.



(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'?

(80, 23)

(c) Estimate f_x at the point B. $f_x \approx \frac{\Delta z}{\Delta x} = \frac{10}{35}$

(d) Estimate f_y at the point B. $f_y \approx 0$ because $\vec{j} \perp$ the level set at B

(e) Estimate $D_{\vec{u}} f$ at the point C, where $\vec{u} = \frac{\vec{i} + \vec{j}}{\sqrt{2}}$.

$D_{\vec{u}} f \approx \frac{\Delta z}{\Delta \text{ Pts in } \vec{u} \text{ direction}} = \frac{10}{25}$