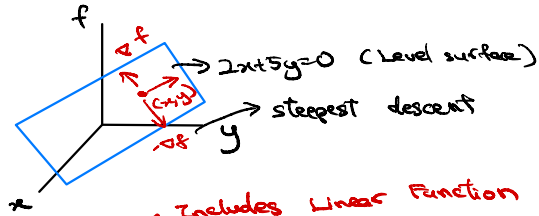




Lecture 22: Gradient Descent: Downhill to a Minimum

Gradient descent $x_{k+1} = x_k - s_k \nabla f(x_k)$
stepsize = learning rate

$$f(x, y) = 2x + 5y$$



- ① Convexity \rightarrow Hessian H is positive semidefinite (includes positive definite)
- ② Strict convexity H is positive definite

Gradient Descent

$$x_{k+1} = x_k - s_k \nabla f(x_k)$$

- ① Exact line search: Increase s_k to make $f(x_{k+1})$ a min in search direction.
 $\nabla f(x_k)$
- ② Backtracking