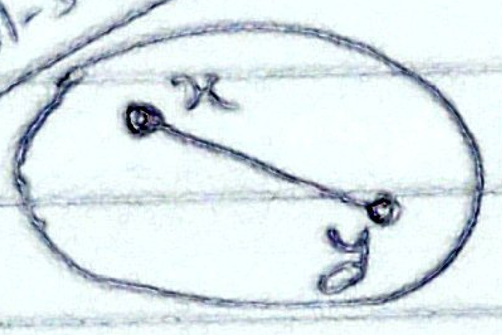
(convex or non-convex)

Inequality:

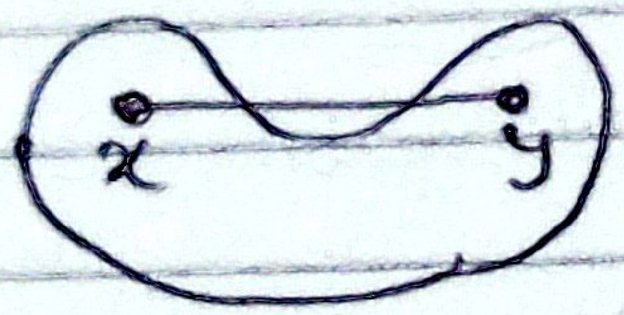
$$f(\lambda x + (1-\lambda)y) \leq \lambda f(x) + (1-\lambda) f(y)$$

$$1 \geq \lambda \geq 0$$

bowl-shaped



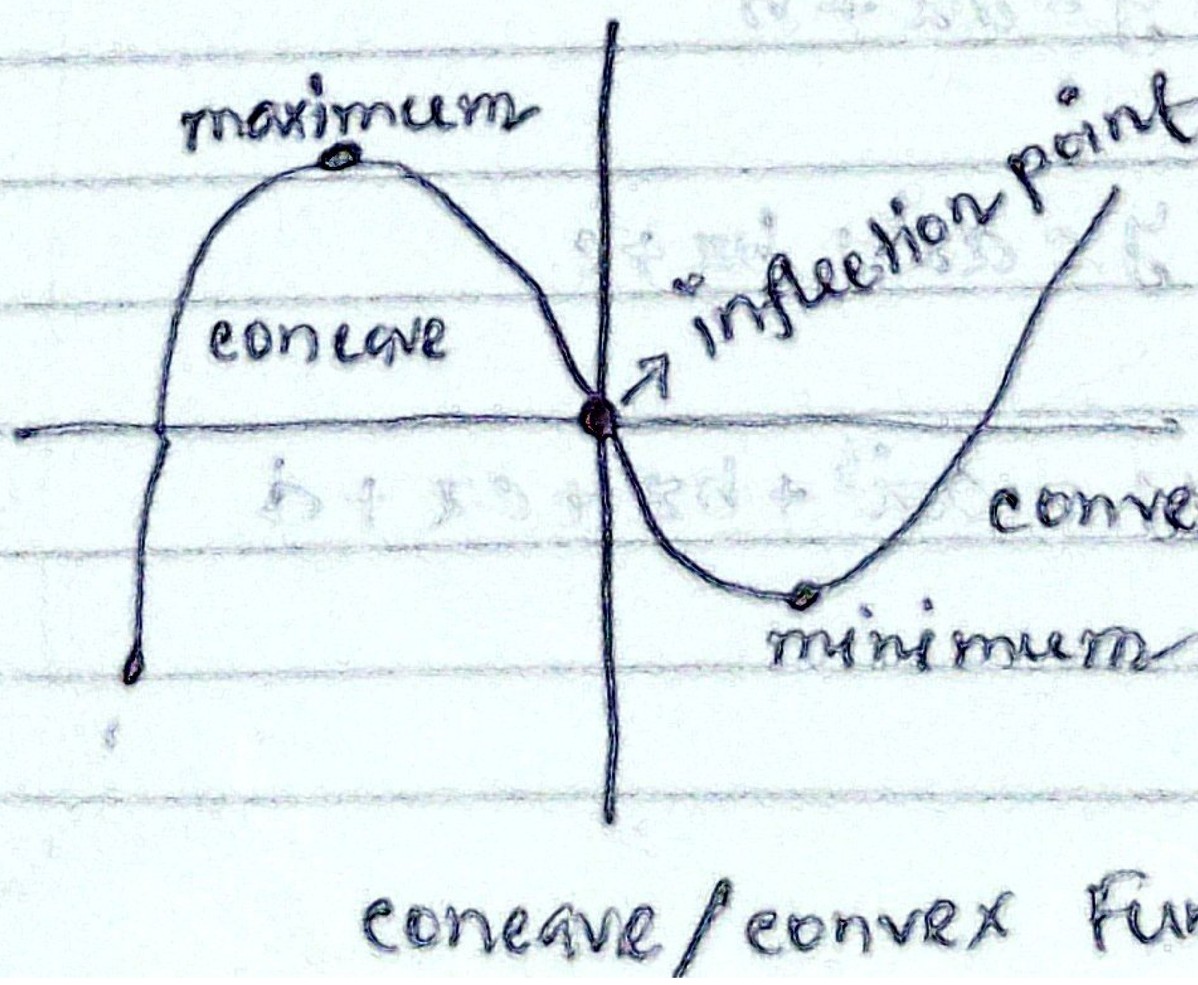
convex



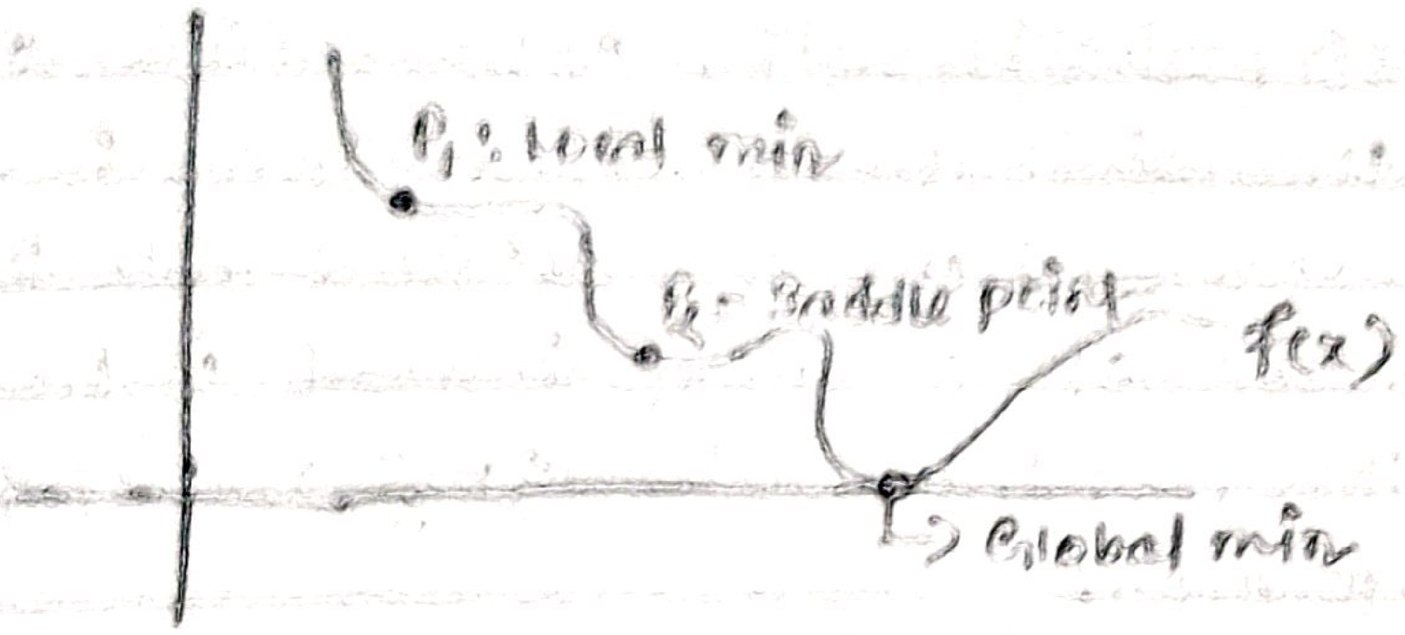
non-covex

$\rightarrow \lambda = 0 \longrightarrow f(0 \cdot x + (1-0)y) = y$ } convex

$\rightarrow \lambda = 1 \longrightarrow f(1 \cdot x + (1-1)y) = x$



concave / convex Function



non convex function

Names and concepts in convex cost functions:

1. Linear Regression: MSE (mean square error)

2. Logistic Regression: logistic loss or cross-entropy loss which is convex for Binary classification.

3. Support Vector Machines (SVMs): the hinge loss.

4. Lasso (L1 regularization), Rige (L2 regularization).

5. Gradient decent:

Non-convex:

1. Neural network: CNNs, RNNs

2. Deep learning:

3. Autoencoders and generative... (GANS)

4. Adam, RMSprop, and SGD with momentum:)