Sem código?

1,6

① a) $y = ax + b$

$$\begin{cases} y_1 = a x_1 + b \\ y_2 = a x_2 + b \\ \vdots \\ y_N = a x_N + b \end{cases}$$

$$\underbrace{\begin{bmatrix} x_1 & 1 \\ x_2 & 1 \\ x_3 & 1 \\ \vdots & 1 \\ x_N & 1 \end{bmatrix}}_{A} \underbrace{\begin{bmatrix} a \\ b \end{bmatrix}}_{x} = \underbrace{\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ \vdots \\ y_N \end{bmatrix}}_{C}$$

-0,3

b) Equação normal $\Rightarrow Ax = b \Rightarrow A^T A x = A^T b$

$$A^T A = \begin{bmatrix} x_1 & x_2 & \dots & x_N \\ 1 & 1 & \dots & 1 \end{bmatrix} \begin{bmatrix} x_1 & 1 \\ x_2 & 1 \\ \vdots & \vdots \\ x_N & 1 \end{bmatrix} = \begin{bmatrix} \sum x_i^2 & \sum x_i \\ \sum x_i & n \end{bmatrix}$$

$$A^T b = \begin{bmatrix} x_1 & x_2 & \dots & x_N \\ 1 & 1 & \dots & 1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix} = \begin{bmatrix} \sum x_i y_i \\ \sum y_i \end{bmatrix}$$

-0,3

③ $[(1-t)p + tq]^2 \leqslant (1-t)p^2 + tq^2$

$p^2(t^2 - 2t + 1) - 2pq(t^2 - t) + t^2 q^2 + (t-1)p^2 - q^2 t \leqslant 0$

$p^2(t^2 - t) - 2pq(t^2 - t) + q^2(t^2 - t) \leqslant 0$

$(t^2 - t)(p^2 - 2pq + q^2) \leqslant 0$

$$\left.\begin{array}{l} (t^2 - t)(p-q)^2 \leqslant 0 \\ \quad\downarrow \qquad\quad \downarrow \\ \leqslant 0 \qquad \geqslant 0 \end{array}\right\} f(x) \text{ é convexa}$$

-0,5

pq?

5.8) $g(w) = \frac{1}{p} \sum_{i=1}^{p} |x_i^T w - y_i|$

Desigualdade Triangular: $|a+b| \leq |a| + |b|$

$\lambda g(w_1) + (1-\lambda) g(w_2) = \frac{1}{p} \sum |\lambda x_i w_1 - \lambda y_i| +$

$\frac{1}{p} \sum |(1-\lambda) x_i w_2 - (1-\lambda) y_i|$

$\geq$

(Pela desigualdade). $\frac{1}{p} \sum | x_i [\lambda w_1 + (1-\lambda) w_2] - \cancel{\lambda y_i} - y_i + \cancel{\lambda y_i}$

$= \frac{1}{p} \sum | x_i [\lambda w_1 + (1-\lambda) w_2] - y_i |$

$= g(\lambda w_1 - (1-\lambda) w_2)$

$-0{,}3$

Isso é um curso do departamento de Matemática, justifique seus passos,