Homework 2 Yucabal Way

Question 4

$L_1 = \frac{1}{n}\sum_{i=1}^{n} |b - y_i|$ for y sort in ascending order

When b is the median, it equals $L_1 = \frac{1}{n}\left(\sum_{i=1}^{\frac{n}{2}} (b - y_i) + \sum_{i=\frac{n}{2}+1}^{n} (y_i - b)\right)$

$$= \frac{1}{n}\left(\sum_{i=1}^{\frac{n}{2}} -y_i + \sum_{i=\frac{n}{2}+1}^{n} y_i\right)$$

$$\frac{dL_1(b)}{db} = \frac{1}{n}\left(\sum_{i=1}^{\frac{n}{2}}(-1) + \sum_{i=\frac{n}{2}+1}^{n} 1\right) = 0$$

$\therefore L_1$ is minimized when b is median.