Assume that you are given a query vector \( q = (2, 3, 1, 2, 5) \), three documents identified as relevant by a user (\( d_1, d_2, d_3 \)), and two irrelevant documents (\( d_4, d_5 \)).

\[
d_1 = (3, 3, 2, 0, 9) \quad d_4 = (1, 0, 0, 7, 2) \\
d_2 = (2, 2, 1, 0, 12) \quad d_5 = (0, 1, 0, 8, 3) \\
d_3 = (3, 2, 1, 0, 9)
\]

Compute the modified query, using the Standard Rochio method. Remember that the Rochio method is given by the formula:

\[
\bar{q}' = \alpha \bar{q} + \frac{\beta}{|D_r|} \sum_{j \in D_r} \bar{d}_j - \frac{\gamma}{|D_n|} \sum_{j \in D_n} \bar{d}_j
\]

where \( D_r \) is the set of the known relevant and \( D_n \) is the set of irrelevant documents.

Use equal weight for the original query, the relevant documents, and the irrelevant ones, \( \alpha = \beta = \gamma = 1 \).

\[
q' = (4.16, 4.83, 2.33, -5.5, 12.5)
\]

ANS: \( q' = (2, 3, 1, 2, 5) + (8, 7, 4, 0, 30) / 3 - (1, 1, 0, 15, 5) / 2 = (2, 3, 1, 2, 5) + (2.66, 2.33, 1.33, 0, 10) - (0.5, 0.5, 0, 7.5, 2.5) = (4.16, 4.83, 2.33, -5.5, 12.5) \)

Solve the same problem for the Ide method and the Ide “Hi Dec” method.