1.

Step 1: Start with the original linear regression model:

Step 2: Subtract the mean of the dependent variable from both sides of the equation. Let $\bar{y}$ represent the mean of $y$:

Step 4: Combine the constants $w\_{0}-\bar{y}$ into one term:

Step 5: By comparing the rearranged equation with the given equation, we can equate the terms:

Step 6: Equate the corresponding terms within the summation:

Step 7: Simplify and isolate the terms:

Step 8: Cancel out the common terms on both sides of the equation:

Step 9: Divide both sides by $-1$ to isolate $w\_{j}$:

Step 10: Finally, rearrange the terms to obtain the desired equation:

Thus, we have shown that the given linear regression model can be represented as the equation mentioned above by subtracting the mean values of the dependent and independent variables, respectively. This process is called centering, and it allows us to remove the intercept term $w\_0$ from the original model.