## **Applying chain rule across multiple paths**

Importance of chain rule in deep learning

1. Let us look at a more complex neural network
2. In the shallow Neural Network from the previous example, we apply the chain rule along a straight path. However, in a more practical Neural Network as shown above, the chain rule needs to be applied across multiple parallel paths in order to find a particular gradient
3. For example, to calculate we need to operate along 3 different paths
4. Summing up the derivatives across the three paths (cyan, orange and pink) will give us the required derivative
5. This scales across as many paths as there are in the neural network.
6. Here, these are not regular derivatives but partial derivatives.