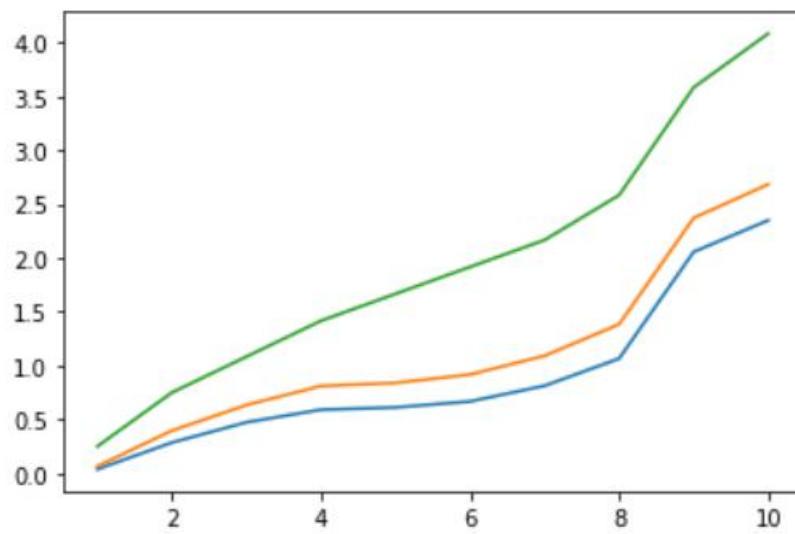
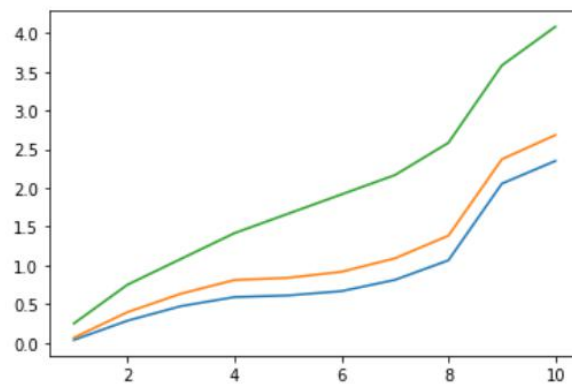


Answer 2:



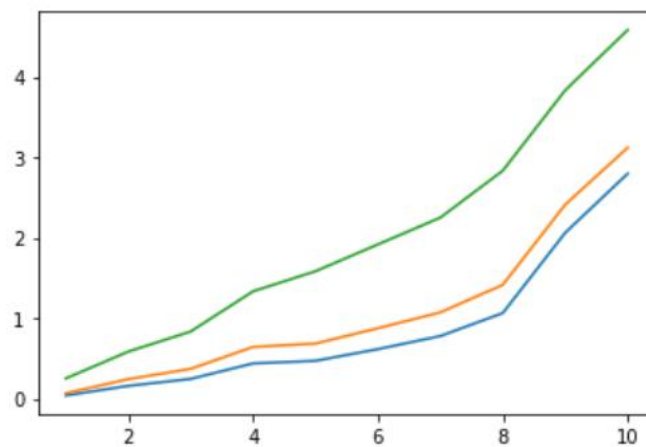
Answer 3:

Out[45]:



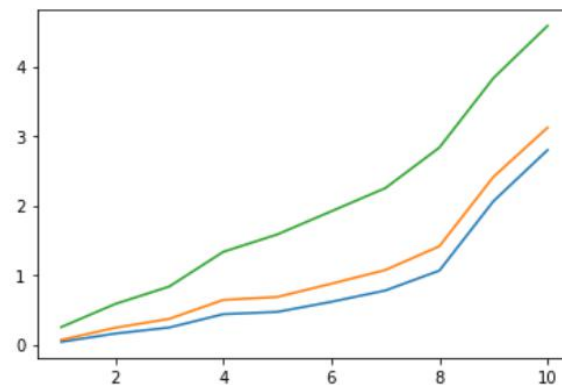
Answer 4:

Out[46]:



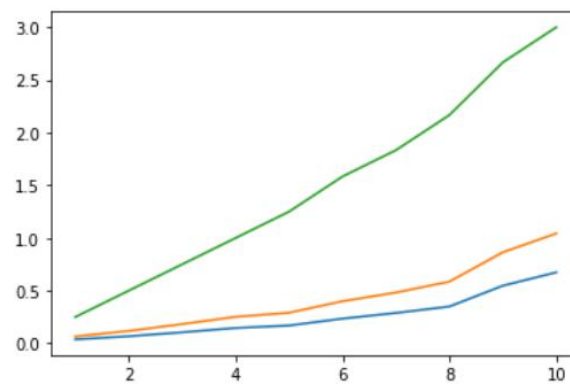
Answer 5:

Out[47]:



Answer 6:

Out[49]:



Answer 7:

First, let's talk about the metrics.

Precision - Precision is the ratio of correctly predicted positive observations to the total predicted positive observations. The question that this metric answers is of all passengers that labeled as survived, how many actually survived? High precision relates to the low false positive rate. We have got 0.788 precision which is pretty good.

$$\text{Precision} = \frac{TP}{TP+FP}$$

Recall (Sensitivity) - Recall is the ratio of correctly predicted positive observations to the all observations in actual class - yes. The question recall answers is: Of all the passengers that truly survived, how many did we label? We have got recall of 0.631 which is good for this model as it's above 0.5.

$$\text{Recall} = \frac{TP}{TP+FN}$$

F1 score - F1 Score is the weighted average of Precision and Recall. Therefore, this score takes both false positives and false negatives into account. Intuitively it is not as easy to understand as accuracy, but F1 is usually more useful than accuracy, especially if you have an uneven class distribution. Accuracy works best if false positives and false negatives have similar cost. If the cost of false positives and false negatives are very different, it's better to look at both Precision and Recall. In our case, F1 score is 0.701.

$$\text{F1 Score} = \frac{2 * (\text{Recall} * \text{Precision})}{(\text{Recall} + \text{Precision})}$$

So in our diagrams, precision is blue, f-score is orange and recall is green. However, looking at the

diagram, cosine distance has the worst value in all of the metrics. The Manhattan distance improved more than euclidean distance improved after $k=8$. So, the Manhattan distance has the highest metric scores.