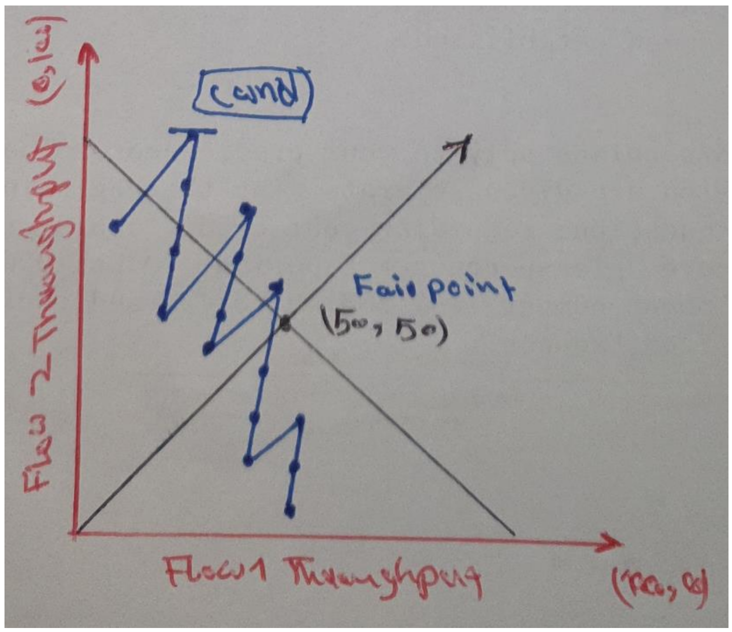
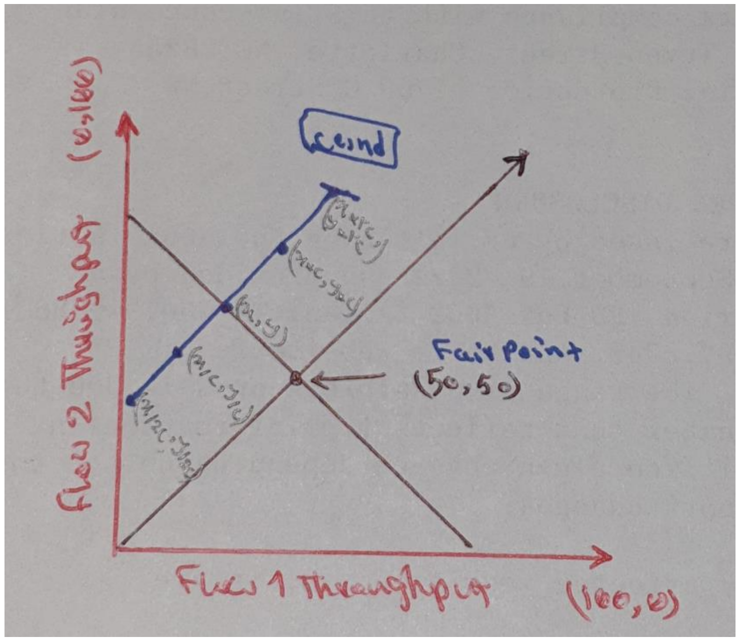
Using the same technique discussed in class (transport-congestion-control.pdf, slide 30) explain why
(1) Multiplicative Increase Additive Decrease,
(2) Multiplicative Increase Multiplicative Decrease, and
(3) Additive Increase, Additive Decrease, are not fair.
Use a figure in each case, similar to slide 6 in lecture to illustrate your answer.

Multiplicative Increase Additive Decrease



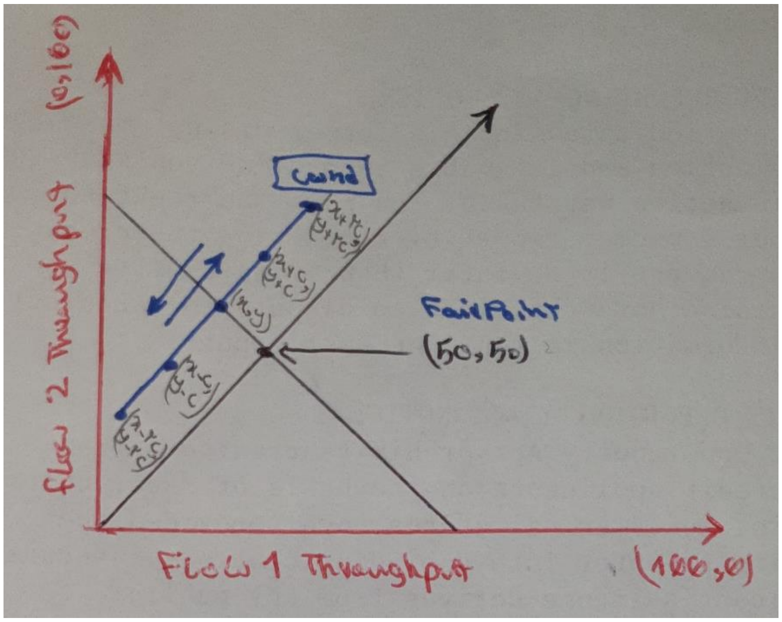
In this technique, the cwnd is reached very quickly due to multiplicative increase of the throughput, after which the descend back to the ssthreshold happens slowly iteratively (and with cwnd being reduced). Hence, across multiple cycles of ascent and descent, we will eventually descend below the fair point, and it will never be reached.

Multiplicative Increase Multiplicative Decrease



Like the AIAD process explained above, let us assume that the multiplicative constant is c. Until the cwnd is reached, both the x and y coordinates (which represent throughputs for Flows 1 and 2) iteratively scale up/multiply by constant factor c. Once it is reached, it will iteratively scale down/divide by the same constant factor c. Hence as we can see from the above graph, the fair point will never be reached, and hence, fairness cannot be achieved.

Additive Increase, Additive Decrease



Let us assume that the additive constant is c. Until the cwnd is reached, both the x and y coordinates (which represent throughputs for Flows 1 and 2) iteratively increase by a constant factor c. Once it is reached, it will iteratively decrease by the same constant factor c. Hence as we can see from the above graph, the fair point will never be reached, and hence, fairness cannot be achieved.

As you can see from these graphs, they eventually drastically favor throughput of one connection over the other, thereby making them unfair.