Question 1

Concurrency is the property of two different tasks to run independently of each other and run at approximately the same time. This could also be achieved using a time sharing mechanism.

Parallelism is the mechanism of achieving concurrency where tasks are run at the same time. This can be achieved using multiple processors.

Question 2

a) A point is created every 1ms. The round trip takes 100us=0.1ms. As this time is much less than the total time required to create the point and as it takes only 10ns to copy the point from kernel to userspace. Hence all the points are read given the 1000 per seconds sampling rate.

b) Now, the 100000 points per second sampling rate creates a point every 10us. The round trip takes 100us. Assuming that the copying from the kernel to userspace memory occurs during the round trip, the time is covered in the overhead of 0.1ms. As the execution takes 100us, the loop would pick up only 10 out of every 100points. Hence the loss of points is 9/10.

c) Assuming the sampling rate of 100000 points per second would create a point every 10us. Hence for the buffer to get filled, it would take 1000*10us=10ms. The read time for the buffer would be 1000*10ns=10us. Hence 1 point would be lost due to the buffer being full and being read during this time. Hence the total number of points loss is 1/1001.

d) A solution for the given problem would be implementing hardware interrupts where the points could be stored in the buffer size of 1000 and read after the buffer gets half full.