Multithreading and Concurrent Programming with Python.

1. Write a multithreaded program that includes the creation of multiple threads performing concurrent operations. The program should process the following mathematical equation:

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p = sin (x) + cos (y) + tan (z)
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The main thread is called MathThread, which acts like a master thread. It creates three worker threads (MathSin, MathCos, and MathTan) and assigns them to compute values for different data inputs. All three worker threads are concurrently executed on shared or dedicated CPUs depending on the type of machine. Although the main thread can continue its execution, in this case, it needs to make sure that all operations are completed before combining individual results. The value of x should be entered by the user.

2. Write a simulation program for the fruit market. The farmer will be able to produce different types of fruits (apple and orange), and put them in the market to sell. The market has limited capacity and farmers have to wait if the capacity is exceeded to sell their fruits. Consumers can come to the market any time and purchase their desired fruits; and if the fruits they want to buy runs out, they are willing to wait until the supply of that kind is ready. (Hint: implementing this market will encounter the producer and consumer problem, and it probably needs multiple buffers for different kinds of fruits). You can assume that a farmer can produce either apple or orange and a customer can purchase either apple or orange.

References:

Rajkumar Buyya, S Thamarai Selvi, Xingchen Chu (2009) Object-Oriented Programming with Java: Essentials and Applications. Tata McGraw Hill Education Private Limited. ISBN: 9780070669086