#1 suppose there are two DEFI protocols P1: xy = c and P2: x+y = 2d.Given two curves meet on 2 points. Consider a situation where the difference in amount of token A on P1 and P2 is D1 and difference in amount of tokenB on P1 and P2 is D2, determine the number of tokenA and tokenB in P2 so that value of D1×D2 is maximum. And whats the max value of D1×D2 ? Is the derived amount of tokenA and tokenB the same?

#2 suppose there is a liquidity pool U1 with protocol P1: xy = 10 M^2 and P2: x+2y = c, A developer wants to create a liquidity pool U2 for tokenA and tokenB using protocol P2, how much total amount of tokenA and tokenB should he add to the pool so that amount of tokenA in pool U1 and U2 are equal and also amount of tokenB in pool U1 and U2 are also equal, but only once.

#3 Consider the DEFI protocol P1: xy = c , where c is constant, suppose a user add liquidity by adding 'a' amount of tokenA and 'b' amount of tokenB now the curve changes to xy = c' ,now in the new curve 'a' amount of token is swapped for tokenB, calculate the swapped amount of tokenB? Is the amount of tokenB obtained equal to 'b'?

#4 In the DEFI protocol P: xy = c, there is a flash swap by an user, the user A borrowed x_1 amount of token0 and he had to repay the borrowed amount in time t_1, where t_1 is the time duration between borrowing and repaying, another user during $t_1/2$ swapped 'p' amount of token0 for token1, suppose swapping works in such a way that input token is given first to protocol and then output the token back to the user, and the duration of the swapping transaction is t2, let us say $t_1 = t_2$. calculate the gain or loss to user B for the output token1.

#5 In DEFI protocol P: xy = c, liquidity is added by amount x_1 and amount y_1, let at point A amount of tokenA and tokenB are same, calculate the minimum distance between point A and the new liquidated curve, in terms of, x_1 and y_1.

#6 In DEFI protocol P: xy = 8M*1M, where 1M=1000000; there is a point A with token0 = $\sqrt{8/\sqrt{3}}$ M and token1 = $\sqrt{8.\sqrt{3}}$ M. There is another point B on the curve, AB subtends 30 degree to origin O. Determine the number of token0 and tpken1 at point B.

#7 Suppose there are two DEFI protocols P1 : xy = c1 and P2 : x + y = c2, consider the situation S where the total liquidity of P1 is twice of P2, what's the relation between the curve of P1 and P2 at situation S ?

#8 There are two DEFI protocols P1 : $x^2 + y^2 = c^2$, and P2 : xy = $4c^2$. Determine the position A on P1 such that spot price at P1 and P2 are equal, and distance of A from xy =$4c^2$ is minimum.

#9 There are two DEFI protocols P1 : xy = $16c^2$ and P2 : x + 4y = $10c$, find the minimum difference between token1 in protocol P1 and P2. where spot price on P1 is 1/4.

#10 suppose there are three DEFI protocols P1 : xy = $9c^2$, P2 : x +4y = c and P3 : 4x + y = c, some amount of token0 and token1 are removed from P1 to achieve the situation where amount of token0 in all protocols i.e P1, P2 and P3 are equal. Determine the ratio of new liquidity to old liquidity in P1.