Log Linearization Practice Problems

Log-linearize the following equations (greek letters are fixed parameters):

1. $f(x) + f(y) = \alpha$ around (X^*, Y^*) satisfying the equation.
2. $W = \theta C/(1-N)$ around (W^*, C^*, N^*) satisfying the equation
3. $W = (1-\alpha)\left(\frac{K}{N}\right)^{\alpha}$ around (W^*, K^*, N^*) satisfying the equation
4. $\left(\frac{A}{B}\right)^{-\alpha} = \beta C$ around (A^*, B^*, C^*) satisfying the equation
5. $S = (1-\delta)K + K^{\alpha}N^{1-\alpha} - C$ around (S^*, K^*, N^*, C^*) satisfying the equation
6. $Y = \sum_{i=1}^{N} \alpha_i X_i$ around $(Y^*, X_1^*, ..., X_N^*)$ satisfying the equation
7. $Y = \sum_{i=1}^{N} X_i^{\beta_i}$ around $(Y^*, X_1^*, ..., X_N^*)$ satisfying the equation
8. $A = (1 + \alpha B^{\epsilon})\left(\frac{C}{D}\right)^{-\beta}$ around (A^*, B^*, C^*, D^*) satisfying the equation.
9. The system of equations:

$$\begin{aligned} C_t^{-\sigma} &= \beta\left(1 + \alpha K_{t+1}^{\alpha-1} - \delta\right) C_{t+1}^{-\sigma} \\ K_t^{\alpha} &= K_{t+1} - (1-\delta)K_t + C_t \end{aligned}$$

   around the steady state $K_t = K_{t+1} = K^*$, $C_t = C_{t+1} = C^*$.