Q No 2

$$f(t) = \sum_{k=-B}^{B} a_k e^{j2\pi k t}$$

$$f(t_1) = a_{-B} e^{j2\pi(-B)t_1} + a_{-B+1} e^{j2\pi(-B+1)t_1} + \cdots + a_B e^{j2\pi B t_1}$$

$$f(t_2) = a_{-B} e^{j2\pi(-B)t_2} + a_{-B+1} e^{j2\pi(-B+1)t_2} + \cdots + a_B e^{j2\pi B t_2}$$

$$\vdots$$

$$f(t_m) = a_{-B} e^{j2\pi(-B)t_m} + a_{-B+1} e^{j2\pi(-B+1)t_2} + \cdots + a_B e^{j2\pi B t_m}$$

This can be written in matrices as:

$$\begin{bmatrix} f(t_1) \\ f(t_2) \\ \vdots \\ f(t_m) \end{bmatrix} = \begin{bmatrix} e^{j2\pi(-B)t_1} & e^{j2\pi(-B+1)t_1} & \cdots & e^{j2\pi(B)t_1} \\ e^{j2\pi(-B)t_2} & e^{j2\pi(-B+1)t_2} & & e^{j2\pi(B)t_2} \\ \vdots & \vdots & & \vdots \\ e^{j2\pi(-B)t_m} & e^{j2\pi(-B+1)t_m} & & e^{j2\pi(B)t_m} \end{bmatrix} \begin{bmatrix} a_{-B} \\ a_{-B+1} \\ \vdots \\ a_B \end{bmatrix}$$

$$y = A\alpha$$

$$\boxed{\alpha = (A^T A)^{-1} A^T y}$$

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