

- ① A LAKE IS STOCKED WITH 300 FISH, AND AFTER 11 MONTHS THERE ARE 500 FISH. IF THE NUMBER OF FISH OBEYS THE LOGISTIC GROWTH MODEL, AND IF THE LAKE CAN SUPPORT A MAXIMUM OF 1500 FISH, FIND WHEN THERE WILL BE 900 FISH. (GIVE AN EXACT ANSWER.)
- ② SOLVE  $Ax = b$ , GIVEN THAT  $A$  IS INVERTIBLE,  $A^{-1} = \begin{bmatrix} 5 & 3 \\ 9 & 2 \end{bmatrix}$ , AND  $b = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$ .
- ③ IF  $B^{-1} = \begin{bmatrix} 4 & 2 \\ 5 & 3 \end{bmatrix}$  AND  $C^{-1} = \begin{bmatrix} 5 & 2 \\ -2 & 6 \end{bmatrix}$ , FIND  $(B^T C)^{-1}$ .
- ④ IF  $A = \begin{bmatrix} 5 & 9 \\ 2 & 4 \end{bmatrix}$  AND  $B^{-1} = \begin{bmatrix} 5 & 6 \\ 9 & 2 \end{bmatrix}$ , FIND  $(AB^T)^{-1}$ .
- ⑤ IF  $A = \begin{bmatrix} 4 & 2 \\ 10 & d \end{bmatrix}$ , FIND ALL VALUES OF  $d$  FOR WHICH  $A$  IS INVERTIBLE.
- ⑥ IF  $A = \begin{bmatrix} 4 & 2 \\ 8 & -2 \end{bmatrix}$ , FIND ALL VALUES OF  $C$  FOR WHICH  $A - CI$  IS NOT INVERTIBLE.
- ⑦ IF  $B = \begin{bmatrix} 1 & 0 \\ -1 & 0 \end{bmatrix}$ , FIND ALL  $2 \times 2$  MATRICES  $A$  SUCH THAT  $AB = 0$ .
- ⑧ IF  $B = \begin{bmatrix} 4 & 1 \\ 3 & 8 \end{bmatrix}$  AND  $C = \begin{bmatrix} 3 & 1 \\ 1 & 8 \end{bmatrix}$ ,  
FIND A NONZERO MATRIX  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  SUCH THAT  $AB = AC$ .
- ⑨ FIND THE VALUES OF  $K$  FOR WHICH THE LINEAR SYSTEM
- $$\begin{aligned} x + y + 2z &= 1 \\ x + 2y + 5z &= 3 \\ 2x + 7y + kz &= 6 \end{aligned}$$
- IS INCONSISTENT.