

## Matrix Worksheet

### Singular matrices

#### Notes

Associated with each square matrix is a number called the determinant, Given matrix  $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ , the determinant  $|A|$  or  $DetA$  is  $ad - bc$ . If the determinant of a matrix is 0 (Zero) that is if  $ad - bc = 0$  the matrix is called SINGULAR MATRIX. A singular matrix is special in that it does not have an inverse, it also indicates that the set of equations from which it is derived has no unique solutions. The inverse of the matrix A is given as  $A^{-1} = \frac{1}{DetA} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

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(1) N is the singular matrix  $\begin{pmatrix} 4 & 2 \\ 3 & k \end{pmatrix}$  Find the value of k

(2) Z is the matrix  $\begin{pmatrix} 3 & 5p \\ 15 & p^3 \end{pmatrix}$

- Write down the determinant of Z
- Calculate the values of p which make the matrix Z singular

(3) Given that  $M = \begin{pmatrix} 3 & b \\ 1 & a \end{pmatrix}$  calculate

- The determinant of M
- A pair of values of a and b such that M is singular

(4) T is the matrix  $\begin{pmatrix} 2q & 0 \\ p & p \end{pmatrix}$

- State the determinant of T
- If  $q = \frac{1}{2}$  and  $p = 4$  determine the inverse of T
- If T is singular and  $p \neq q$  state a pair of values for p and q

(5) R is the matrix  $\begin{pmatrix} 3r & 1 \\ s & 2s \end{pmatrix}$

- State in terms of s and r, the determinant of R
- If  $r = \frac{1}{3}$  and  $s = 4$  determine the inverse of R
- State a pair of values of r and s, not including zero which makes the matrix R a singular matrix

(6) Find the values of x for which the matrix  $P = \begin{pmatrix} 3x & 4 \\ 6x & x \end{pmatrix}$  is a singular matrix

(7) Given that  $Z = \begin{pmatrix} 2 & 1 \\ 6 & 5 \end{pmatrix}$

- say why Z is a non singular matrix
- Determine  $Z^{-1}$