

551

(1) [5+2 marks
Elimination]

$$\begin{cases} x_1 - x_2 = -1 \\ 2x_1 - 2x_2 = -2 \\ 4x_1 - 4x_2 = -4 \\ -4x_1 + 4x_2 = 4 \end{cases}$$

(ii) Find th

$$(i) \begin{pmatrix} \textcircled{1} & -1 \\ 2 & -2 \\ 4 & -4 \\ -4 & 4 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -1 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & -1 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$$

The system
variables (x_1, x_2)

\Rightarrow Gen

$$\begin{pmatrix} 0 & 0 \\ 1 & 1 \end{pmatrix}$$

$$x_2 = -3$$

$$x_1 = 1$$

$$\rightarrow (x_1, x_2)$$

⇒ a

C

D

(3) [4 marks]
(exactl

$$\begin{cases} -x_1 \\ -2x_1 \\ 3x_1 \end{cases}$$

$$\begin{array}{r} 4 \\ 10 \\ -11 \end{array} \begin{array}{r} -2 \\ 2p \\ p^2+1 \end{array}$$

$$=0 \rightarrow$$

$$f \quad p=1$$

$$p \neq 0, 1 \\ (p^2 - p \neq 0)$$

$$=0 \rightarrow$$

(4) [4 marks]

$$5M +$$

$$5M =$$

$$M = \frac{1}{5}$$

(5) [4 marks]

$$\begin{pmatrix} 1 & 2 & 0 \\ -1 & -2 & 1 \\ 0 & 3 & 0 \end{pmatrix} \xrightarrow{\textcircled{1}} \begin{pmatrix} 1 & 2 & 0 \\ 0 & 2 & 1 \\ 0 & 3 & 0 \end{pmatrix}$$

$$\xrightarrow{\textcircled{4}} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix}$$

Since $E_4 E_3 E_2$

we have

$$M^{-1} = E_4$$

(There are oth

(6) [3+3 marks]
possible, the

$$\rightarrow \frac{1}{2} (C^T)^{-1} A^{-1} (A^T)^{-1}$$

$$\rightarrow \frac{1}{2} \underbrace{(C^T)^{-1} C^T}_{I} B^T$$

(ii) Now solve

$$\rightarrow B X = 2 \bar{B}^{-1} D^T$$

(7)

(A)

(8)

(ii)

$$\left(\det(\text{adj}(A)) \right)^n$$

(9) [4+]

$$D = (-3) \begin{vmatrix} a \\ b \\ c \end{vmatrix}$$

$$= -3 \begin{vmatrix} a \\ b \\ c \end{vmatrix}$$

$$= -6 \begin{vmatrix} a \\ b \\ c \end{vmatrix}$$

(ii) Evaluate

No marks

$$D = 3 \cdot \begin{vmatrix} 6 & 1 \\ 2 & -1 \\ 7 & 1 \\ -5 & 1 \end{vmatrix}$$

$$= 3 \cdot (-1) \begin{vmatrix} 8 \\ 9 \\ -1 \end{vmatrix}$$

$$= -9 \cdot \begin{vmatrix} 5 \\ 3 \\ -3 \end{vmatrix}$$

(10) [3+3 marks] Let

(i) If $\vec{u} \perp \vec{v}$, then

$$\vec{u} \perp \vec{v} \Rightarrow \vec{u} \cdot \vec{v} = 0$$

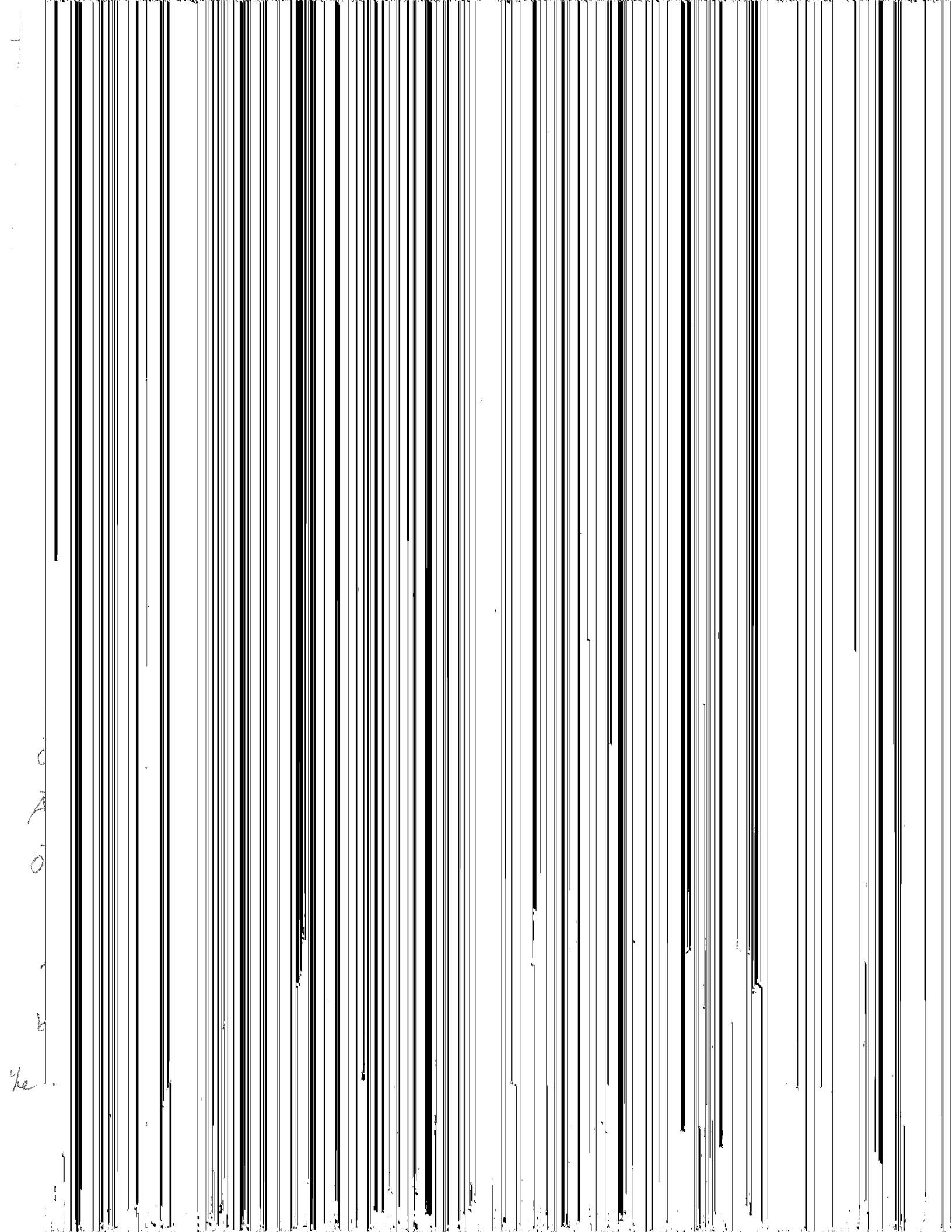
(ii) Simplify the

The expression =

$$= 1$$

$$= 1$$

$$= 1$$



0

A

0

b

ke

Need to

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Since

And sin
directly

set \vec{n}

Hence: 7

(1

• Need to

$$\begin{cases} x-2 \\ 2x-3 \end{cases}$$

Thus

• 2nd app:

as a

Now we

Setting:

Thus the

the distan

(15)

Need to

$$\begin{pmatrix} 3 & -4 \\ 1 & 3 \\ -4 & -1 \end{pmatrix}$$

(i)

We may

$$\vec{n} = (3, 1)$$

$$= (-11)$$

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