

# A Poem Problem

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The year is 2025, 4 years since the ruler of Earth, the benevolent MAX, came into power and outlawed all forms of pointless self-expression. Since the fall of the decadent, sinful old-world, you have kept your head down and worked your way into the office of the supreme leader of the world. Years of effort has come to this opportunity. Your dastardly plot will doubtlessly get you killed, or worse, if you are ever discovered, but you consider this a small price to pay. Your aim is to send your favourite poems to your friends around the world by hiding them in the daily propaganda broadcast from the leader's own office. The message will be hidden using a simple cipher in which each letter may be replaced with another.

The cipher's key consists of a set of rules. Each rule is a pair of letters mapping the first letter to a second letter in the encrypted string. No character will be mapped (appear as the first letter) more than once, and all characters in a rule will be uppercase English letters. Characters not appearing in a rule should not be changed in the encrypted string. The final step of your plan is to create a program that can both encrypt and decrypt the hidden poems.

## Input Specification

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The input begins with two lines. The first line contains a single integer  $N$  ( $1 \leq N \leq 26$ ) the numbers of rules in the cipher. The second line contains a single integer  $M$  ( $1 \leq M \leq 300$ ), the number of lines to encrypt or decrypt respectively. Following this will be  $N$  lines, each containing two uppercase English characters which define a rule. Then, there will be  $M$  lines, each containing two strings. The first string will be either **E** or **D**, which corresponds to encrypt and decrypt respectively. The second string should be either encrypted or decrypted, and will consist of between 1 and 1000 characters inclusive, each of which will be either an uppercase English letter or the underscore character `_`.

## Output Specification

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Display  $M$  lines containing the encrypted or decrypted strings.

## Sample Input 1

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```
2
3
A B
B A
E ABC
E ABCABCABC
D BACBACBAC
```

## Sample Output 1

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BAC  
BACBACBAC  
ABCABCABC

## Sample Input 2

23  
29  
S Q  
T K  
J E  
U A  
H Z  
R W  
E X  
B M  
O Y  
V S  
Y B  
Q V  
K J  
M U  
L D  
D F  
X L  
W R  
Z P  
P I  
I T  
A O  
F H  
D KBGXW\_KBGXW\_MAWNTNG\_MWTGZK  
D TN\_KZX\_HYWXQKQ\_YH\_KZX\_NTGZK  
D RZOK\_TUUYWKOD\_ZONF\_YW\_XBX  
D CYADF\_HWOUX\_KZB\_HXOWHAD\_QBUUXKWB  
D \_  
D TN\_RZOK\_FTQKONK\_FXXIQ\_YW\_QJTXQ  
D MAWNK\_KZX\_HTWX\_YH\_KZTNX\_XBXQ  
D YN\_RZOK\_RTNGQ\_FOWX\_ZX\_OQITWX  
D RZOK\_KZX\_ZONF\_FOWX\_QXTPX\_KZX\_HTWX  
D \_  
D ONF\_RZOK\_QZYADFXW\_RZOK\_OWK  
D CYADF\_KRTQK\_KZX\_QTNXRQ\_YH\_KZB\_ZXOWK  
D ONF\_RZXN\_KZB\_ZXOWK\_MXGON\_KY\_MXOK  
D RZOK\_FWXOF\_ZONF\_RZOK\_FWXOF\_HXXK  
D \_  
D RZOK\_KZX\_ZOUUXW\_RZOK\_KZX\_CZ0TN

D TN\_RZOK\_HAWNOCX\_ROQ\_KZB\_MWOTN  
D RZOK\_KZX\_ONSTD\_RZOK\_FWXOF\_GWOQI  
D FOWX\_TKQ\_FXOFDB\_KXWWYWQ\_CDOQI  
D \_  
D RZXN\_KZX\_QKOWQ\_KZWXR\_FYRN\_KZXTW\_QIXOWQ  
D ONF\_ROKXWF\_ZXOSXN\_RTKZ\_KZXTW\_KXOWQ  
D FTF\_ZX\_QUTDX\_ZTQ\_RYWJ\_KY\_QXX  
D FTF\_ZX\_RZY\_UOFX\_KZX\_DOUM\_UOJX\_KZXX  
D \_  
D KBGXW\_KBGXW\_MAWNTNG\_MWTGZK  
D TN\_KZX\_HYWXQKQ\_YH\_KZX\_NTGZK  
D RZOK\_TUUYWKOD\_ZONF\_YW\_XBX  
D FOWX\_HWOUX\_KZB\_HXOWHAD\_QBUUXKWB

## Sample Output 2

TYGER\_TYGER\_BURNING\_BRIGHT  
IN\_THE\_FORESTS\_OF\_THE\_NIGHT  
WHAT\_IMMORTAL\_HAND\_OR\_EYE  
COULD\_FRAME\_THY\_FEARFUL\_SYMMETRY  
\_  
IN\_WHAT\_DISTANT\_DEEPS\_OR\_SKIES  
BURNT\_THE\_FIRE\_OF\_THINE\_EYES  
ON\_WHAT\_WINGS\_DARE\_HE\_ASPIRE  
WHAT\_THE\_HAND\_DARE\_SEIZE\_THE\_FIRE  
\_  
AND\_WHAT\_SHOULDER\_WHAT\_ART  
COULD\_TWIST\_THE\_SINEWS\_OF\_THY\_HEART  
AND\_WHEN\_THY\_HEART\_BEGAN\_TO\_BEAT  
WHAT\_DREAD\_HAND\_WHAT\_DREAD\_FEET  
\_  
WHAT\_THE\_HAMMER\_WHAT\_THE\_CHAIN  
IN\_WHAT\_FURNACE\_WAS\_THY\_BRAIN  
WHAT\_THE\_ANVIL\_WHAT\_DREAD\_GRASP  
DARE\_ITS\_DEADLY\_TERRORS\_CLASP  
\_  
WHEN\_THE\_STARS\_THREW\_DOWN\_THEIR\_SPEARS  
AND\_WATERD\_HEAVEN\_WITH\_THEIR\_TEARS  
DID\_HE\_SMILE\_HIS\_WORK\_TO\_SEE  
DID\_HE\_WHO\_MADE\_THE\_LAMB\_MAKE\_THEE  
\_  
TYGER\_TYGER\_BURNING\_BRIGHT  
IN\_THE\_FORESTS\_OF\_THE\_NIGHT  
WHAT\_IMMORTAL\_HAND\_OR\_EYE  
DARE\_FRAME\_THY\_FEARFUL\_SYMMETRY

## Sample Input 3

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```
17
14
C K
M C
R O
J A
H M
Q H
N P
P N
I E
A G
O I
K R
G J
D Q
E F
F L
L D
E I MET A TRAVELLER FROM AN ANTIQUE LAND
E WHO SAID TWO VAST AND TRUNKLESS LEGS OF STONE
E STAND IN THE DESERT NEAR THEM ON THE SAND
E HALF SUNK A SHATTERD VISAGE LIES WHOSE FROWN
E AND WRINKLED LIP AND SNEER OF COLD COMMAND
E TELL THAT ITS SCULPTOR WELL THOSE PASSIONS READ
E WHICH YET SURVIVE STAMPD ON THESE LIFELESS THINGS
E THE HAND THAT MOCKD THEM AND THE HEART THAT FED
E AND ON THE PEDESTAL THESE WORDS APPEAR
E MY NAME IS GOZZYMANDIAS KING OF KINGS
E LOOK ON MY WORKS YE MIGHTY AND DESPAIR
E NOTHING BESIDE REMAINS ROUND THE DECAY
E OF THAT COLOSSAL WRECK BOUNDLESS AND BARE
E THE LONE AND LEVEL SANDS STRETCH FAR AWAY
```

## Sample Output 3

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E\_CFT\_G\_TOGVFDDFO\_LOIC\_GP\_GPTEHUF\_DGPQ  
WMI\_SGEQ\_TWI\_VGST\_GPQ\_TOUPRDFSS\_DFJS\_IL\_STIPF  
STGPQ\_EP\_TMF\_QFSFOT\_PFGO\_TMFC\_IP\_TMF\_SGPQ  
MGDL\_SUPR\_G\_SMGTTFOQ\_VESGJF\_DEFS\_WMISF\_LOIWP  
GPQ\_WOEPRDFQ\_DEN\_GPQ\_SPFFO\_IL\_KIDQ\_KICCGPQ  
TFDD\_TMGT\_ETS\_SKUDNTIO\_WFDD\_TMISF\_NGSSEIPS\_OFGQ  
WMEKM\_YFT\_SUOVEVF\_STGCNQ\_IP\_TMFSF\_DELFDFSS\_TMEPJS  
TMF\_MGPQ\_TMGT\_CIKRQ\_TMFC\_GPQ\_TMF\_MFGOT\_TMGT\_LFQ  
GPQ\_IP\_TMF\_NFQFSTGD\_TMFSF\_WIOQS\_GNNFGO  
CY\_PGCF\_ES\_JIZZYCGPQEGS\_REPJ\_IL\_REPJS  
DIIR\_IP\_CY\_WIORS\_YF\_CEJMTY\_GPQ\_QFSNGEO  
PITMEPJ\_BFSEQF\_OFCGEPS\_OIUPQ\_TMF\_QFKGY  
IL\_TMGT\_KIDISSGD\_WOFKR\_BIUPQDFSS\_GPQ\_BGOF  
TMF\_DIPF\_GPQ\_DFVFD\_SGPQS\_STOFTKM\_LGO\_GWGY