1. The following ciphertext was encrypted using the Playfair cipher. The first eight letters of the plaintext are "thisispr". Determine the secret key and decrypt the whole ciphertext. (Note: I may choose to reveal more of the plaintext, but I haven't made that decision yet.)

hodzdokbivnuavufdkildpuphyycwvidiaohlvldfovnfoyckiilulpwkxeadgpzalinlhodzpblayziyvokrofeaaiaobputzycafulbldlafpyhrpritimoygtktiokrofyogwpfplazyzycafhpihopioayuryrmydbibblinolhrtrvttiyzkfa dabecpgahoilfdunzddcunoeeduvmhpypzyvzddcryrlhsdkiladayohycpw diasvvpvbrdyvdktpyurmulgavphfyychmyfmrkutpwxychmhip

We have the first 20 letters of the plaintext which is “thisisprobablyaweird”. Using this plaintext, we know that the following pair of letters encrypt to:

<table>
<thead>
<tr>
<th>TH</th>
<th>HO</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS</td>
<td>DZ</td>
</tr>
<tr>
<td>PR</td>
<td>OK</td>
</tr>
<tr>
<td>OB</td>
<td>BI</td>
</tr>
<tr>
<td>AB</td>
<td>VN</td>
</tr>
<tr>
<td>LY</td>
<td>UA</td>
</tr>
<tr>
<td>AW</td>
<td>VU</td>
</tr>
<tr>
<td>EI</td>
<td>FD</td>
</tr>
<tr>
<td>RD</td>
<td>KI</td>
</tr>
</tbody>
</table>

Looking at the first pair of letters TH -> HO, we know that the lie consecutively either in a single row or a single column because of the repetition of the letter “H” in both the plaintext and the ciphertext. Using this knowledge, I initially tried to place T, H, and O in the same column as shown below:

```
T - - - -
H - - - -
O - - - -
- - - - -
- - - - -
```

This satisfies the encryption of the first pair of letters which is T and H as they encrypt by shifting downwards one position to H and O. Next, I took the letter pair PR -> OK as it has the letter O that was already placed in the key matrix. For PR to encrypt to OK, it could either be a box encryption or same row encryption. I tried both ways to come up with the following possible partial key matrices:

```
T - - - -
H - - - -
O - P -
R - K -
- - - -
```

From these possible partial encryption key matrices, we can see that the tested encryptions work out, however there doesn’t seem to be the presence of any alphabetical order. This is usually the case for the first two rows due to the use of a specific keyword. I am deducing
this from the number of Playfair cipher questions I have been exposed to both in class and online. This leads me to believe that my initial assumption of placing T, H, and O in the same column might be wrong. So, I started over and tried placing the letters T, H, and O in the same row as shown below:

```
T H O - -
- - - - -
- - - - -
- - - - -
- - - - -
```

Now, taking the next pair of letters PR -> OK, we know that this will have to be a box encryption. Keeping this in mind, I added it to the partial matrix:

```
T H O P -
- - R K -
- - - - -
- - - - -
```

Having satisfied that letter pair encryption, I went ahead to add OB -> BI. This encryption can either be on the same row or same column due to repetition of letter B in both the plaintext and ciphertext. However, looking at the key matrix that I have so far, I was unable to place B and I correctly on the same row or column as the row didn’t have enough space to accommodate two letters and pushing the letters R and K to the fourth row will contradict with my assumption of alphabetical order present in the last three rows.

Keeping this in mind, I decided to start over with the letters T, H, and O in the same row but not starting from the first column. The reason I am keeping these letters in the first row is because they aren’t in alphabetical order which leads me to believe that these letters might be part of the desired keyword. I changed the encryption key matrix to:

```
- - T H O
- - - - -
- - - - -
- - - - -
```

With this, I tried placing PR -> OK in the matrix. I put the letter P in the first row first column position as I expected a vowel to follow it in the second column to make an English keyword and because the letters K and R have 6 letters between them which would cause it to be on the opposite ends of the matrix, given that there are 3 of those 6 letters in the keyword. We can already see that P and O are part of the keyword. I placed the letters K and R in the fourth row because placing them in the rows before it will cause there to be insufficient letters to fill the spaces after R as there are only 8 maximum letters after R if none of them are present in the keyword. This is the partial matrix I have so far:
Next, it was easy to place OB -> BI as it would clearly be in the same column.

\[
\begin{array}{cccc}
\text{P} & \text{T} & \text{H} & \text{O} \\
- & - & - & - \\
- & - & - & - \\
\text{K} & - & - & \text{R} \\
- & - & - & - \\
\end{array}
\]

With this matrix, I then took the letter pair RD -> KI as the letters R, K, and I were already in the key matrix. This is a box encryption, so I was able to form the following key:

\[
\begin{array}{cccc}
\text{P} & \text{T} & \text{H} & \text{O} \\
- & - & - & \text{B} \\
- & - & - & \text{I/J} \\
\text{K} & - & - & \text{R} \\
- & - & - & - \\
\end{array}
\]

The letters E, F, and G can easily fall between D and I as H was already present in the key.

\[
\begin{array}{cccc}
\text{P} & \text{T} & \text{H} & \text{O} \\
- & - & - & \text{B} \\
\text{D} & - & - & \text{I/J} \\
\text{K} & - & - & \text{R} \\
- & - & - & - \\
\end{array}
\]

Next, I took the letter pair IS -> DZ, which was a box encryption based on the current state of the key matrix. This was the resulting matrix after the placement of S and Z:

\[
\begin{array}{cccc}
\text{P} & \text{T} & \text{H} & \text{O} \\
- & - & - & \text{B} \\
\text{D} & \text{E} & \text{F} & \text{G} & \text{I/J} \\
\text{K} & - & - & \text{R} \\
\text{S} & - & - & \text{Z} \\
\end{array}
\]

Since T was already present in the matrix, I decided to put the letter U right after S. From inspecting the letter pair LY -> UA, I was able to see that Y was probably in the first two rows (part of the keyword) as it was mapping to the letter A. Using same column encryption, I placed L right next to K based on the alphabetical order and Y on top of A.

\[
\begin{array}{cccc}
\text{P} & \text{Y} & \text{T} & \text{H} & \text{O} \\
- & - & - & - & - \\
\end{array}
\]
Next, the letter pair AB -> VN was a same row encryption and AW -> VU was a block encryption that was easy to figure out once I placed the letter V in the matrix.

\[
\begin{array}{cccccccc}
A & B & D & E & F & G & I/J \\
K & L & - & - & R \\
S & U & W & - & Z \\
\end{array}
\]

Now that I have most of the key matrix, I was able to go through and place as many missing letters based on the letters already used in the keyword. By doing this, I was able to complete the encryption key matrix which ended up being the following:

\[
\begin{array}{cccccccc}
P & Y & T & H & O \\
N & A & V & - & B \\
D & E & F & G & I/J \\
K & L & - & - & R \\
S & U & W & X & Z \\
\end{array}
\]

Keyword: PYTHON AVC

Plaintext found by decrypting using the key matrix:

```
thisisprobablyaweirdkeysothatmightmakeitabitharderletsqsayifyou
ubreakthisoneyougetaprizemaybebynnowyouhavelearnedtologokforthe
wordprizethistimeyouhavetogotothebulqletinboardbyroqomtwofoors
evenainhethereisansignuntackitandyoulqleqeanotethattqtelqysyo
uwhatqtodo
```

“This is probably a weird key so that might make it a bit harder. Let’s say if you break this one, you get a prize. Maybe by now you have learned to look for the word prize. This time you have to go to the bulletin board by room two four seven in HEC. There is a sign. Untack it and you’ll see a note that tells you what to do.”

What is funny is that the keyword was meant to be: "PythonJavaC", but in the program I use to make these (not one I wrote), they ignore J's completely, so effectively, the key became Python AVC, which has a meaning I was unaware of. So I had thought that I used the ten letters p,y,t,h,o,h,i/j,a,v,c for the first two rows, but really the i/j character ended up being the last one on row 3. (Sidebar from Arup)
2. The following was encrypted using the Hill Cipher with a 2 x 2 matrix as the key. Determine both the decryption key as well as the message itself.

$qbnusejtppjwqbekguwqfmuocleknnzfdcvsqyeqjlewcixdjtc0oenmoeivbraqxd$ 

Please solve this problem via brute force, where you try each possible decryption key.

For this question, brute force is the most straightforward approach to decrypting the given ciphertext. I wrote the code `hillcipher.c` to try all possible values for a, b, c, and d from the 2x2 encryption key matrix. This code will output the corresponding plaintext for each set of keys to a file called `out.txt`. Having all the plaintext in the file, I was able to search for common words like “the” and “is” to find the plaintext to cut down looking through the entire file.

Plaintext:

“theduedateofthisassignmentisnationalicecreamconedayyoushouldbuyone”

“`The due date of this assignment is national ice cream cone day. You should buy one.”`

Decryption key: $M^{-1} = \begin{pmatrix} 8 & 21 \\ 9 & 19 \end{pmatrix}$
3. Let \( M = \begin{pmatrix} 11 & 18 \\ 15 & 17 \end{pmatrix} \) be the encryption key for the Hill cipher. What is the corresponding decryption key?

Methods for finding the decryption key:

- **Method 1:**
  
  - Find the determinant (This is \((ad-bc) \mod 26\) where \( M = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \)):
    - \((11*17-18*15) \mod 26 = -83 \mod 26 = 21\).
  
  - Find the inverse of the determinant (looking up on the reference sheet):
    - \(21^{-1} \mod 26 = 5\).
  
  - Compose the matrix first as \( \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \mod 26\):
    - \( \begin{pmatrix} 17 & -18 \\ -15 & 11 \end{pmatrix} \mod 26 = \begin{pmatrix} 17 & 8 \\ 11 & 11 \end{pmatrix} \).
  
  - Multiply the matrix by the inverse of the determinant (5);
    - \(5 \begin{pmatrix} 17 & -18 \\ -15 & 11 \end{pmatrix} \mod 26 = \begin{pmatrix} 85 & -90 \\ -75 & 55 \end{pmatrix} \mod 26 = \begin{pmatrix} 7 & 14 \\ 3 & 3 \end{pmatrix}\).
  
  - The decryption key is \( \begin{pmatrix} 7 \\ 3 \end{pmatrix} \).

- **Method 2:**
  
  - Consider the identity \( \begin{pmatrix} 11 & 18 \\ 15 & 17 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \mod 26\), you can compose the following set of equations in order to find \( \begin{pmatrix} a & b \\ c & d \end{pmatrix} \), the decryption key:
    - \(11a + 18c = 1 \mod 26\)
    - \(15a + 17c = 0 \mod 26\)
    - \(11b + 18d = 0 \mod 26\)
    - \(15b + 17d = 1 \mod 26\)
  
  - Use like terms to perform arithmetic with the first and second and third and fourth equations:
    - \(15(11a + 18c = 1 \mod 26) \rightarrow 165a + 270c = 15 \mod 26\)
    - \(11(15a + 17c = 0 \mod 26) \rightarrow 165a + 187c = 0 \mod 26\)
    - Subtract one from the other: \(83c = 15 \mod 26 \rightarrow 5c = 15 \mod 26\)
    - Lookup \(5^{-1} \mod 26\) on the reference sheet = 21
    - Multiply by 21 and \( \mod 26\):
      - \(105c = 315 \mod 26\)
      - \(c = 3 \mod 26\)
  
  - Substitute c:
    - \(11a + 18(3) = 1 \mod 26\)
    - \(11a + 54 = 1 \mod 26\)
    - \(11a + 2 = 1 \mod 26\)
    - \(11a = (1-2) \mod 26\)
    - \(11a = 25 \mod 26\)
  
  - Lookup \(11^{-1} \mod 26\) on the reference sheet = 19
Multiply by 19 and mod26:
- \[ 209a = 475 \mod 26 \]
  - \[ a = 7 \mod 26 \]
- \[ 15(11b + 18d = 0 \mod 26) \rightarrow 165b + 270d = 0 \mod 26 \]
- \[ 11(15b + 17d = 1 \mod 26) \rightarrow 165b + 187d = 11 \mod 26 \]
Subtract one from the other: \[ 83d = -11 \mod 26 \rightarrow 5d = 15 \mod 26 \]
- Lookup \( 5^{-1} \mod 26 \) on the reference sheet = 21
- Multiply by 21 and mod26:
  - \[ 105d = 315 \mod 26 \]
  - \[ d = 3 \mod 26 \]
Substitute d:
- \[ 11b + 18(3) = 0 \mod 26 \]
- \[ 11b + 54 = 0 \mod 26 \]
- \[ 11b + 2 = 0 \mod 26 \]
- \[ 11b = -2 \mod 26 \]
- \[ 11b = 24 \mod 26 \]
- Lookup \( 11^{-1} \mod 26 \) on the reference sheet = 19
- Multiply by 19 and mod26:
  - \[ 209b = 456 \mod 26 \]
  - \[ b = 14 \mod 26 \]

Thus, the decryption key is \( \begin{pmatrix} 7 & 14 \\ 3 & 3 \end{pmatrix} \).
4. You have intercepted a tiny portion of both the plaintext and matching ciphertext of a message encrypted using the Hill cipher with a 2 x 2 matrix key. The plaintext is "FISH" and the corresponding ciphertext is "IDBH". What are the possible encryption keys based on this information only? Please solve this problem by hand setting up four equations and not by brute force.

FISH = [5, 8, 18, 7], IDBH = [8, 3, 1, 7]. The encryption key \( \begin{pmatrix} a & b \\ c & d \end{pmatrix} \) can be found by setting up a system of equations like so:

- \( \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 5 \\ 3 \end{pmatrix} = \begin{pmatrix} 8 \\ 7 \end{pmatrix} \mod 26 \)
  - 5a + 8b = 8 \mod 26
  - 5c + 8d = 3 \mod 26

- \( \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 18 \\ 7 \end{pmatrix} = \begin{pmatrix} 1 \\ 7 \end{pmatrix} \mod 26 \)
  - 18a + 7b = 1 \mod 26
  - 18c + 7d = 7 \mod 26

Taking equation (iii):
- 18a + 7b = 1 \mod 26
- 7b = (1 - 18a) \mod 26
- Multiplying by 7 \(-1 \mod 26\):
  - 15(7b = (1 - 18a) \mod 26)
  - b = (15 - 270a) \mod 26
  - b = (15 - 10a) \mod 26

Plug in b in (i):
- 5a + 8b = 8 \mod 26
- 5a + 120 - 80a = 8 \mod 26
- 5a + 16 - 2a = 8 \mod 26
- 3a = -8 \mod 26
- 3a = 18 \mod 26
- Multiplying by 3 \(-1 \mod 13\):
  - 9(3a = 18 \mod 26)
  - a = 162 \mod 26
  - a = 6 \mod 26
  - a = 6

Plug in value of a in (i) to get b:
- 5(6) + 8b = 8 \mod 26
- 30 + 8b = 8 \mod 26
- 8b = -22 \mod 26
- 8b = 4 \mod 26 \Rightarrow 8b = 4 + 26n
- 4b = 2 + 13n \Rightarrow 4b = 2 \mod 13
- Calculating 4 \(-1 \mod 13\):
  - 13 = 3 \times 4 + 1
  - 13 = 3 \times 4 = 1
  - 4 \(-1 \mod 13\) = -3 \mod 13 = 10
- 10(4b = 2 \mod 13)
- b = 20 \mod 13
\begin{itemize}
  \item $b = 7 \mod 13$
  \item $b$ can also be $7 + 13 = 20$
  \item $b = 7, 20$
  \item Taking equation (iv):
    \begin{itemize}
      \item $18c + 7d = 7 \mod 26$
      \item $7d = (7 - 18c) \mod 26$
      \item Multiplying by $7^{-1} \mod 26$:
        \begin{itemize}
          \item $15(7d = (7 - 18c) \mod 26)$
          \item $d = (105 - 270c) \mod 26$
          \item $d = (1 - 10c) \mod 26$
        \end{itemize}
    \end{itemize}
  \item Plug in $d$ in (ii):
    \begin{itemize}
      \item $5c + 8(1 - 10c) = 3 \mod 26$
      \item $5c + 8 - 80c = 3 \mod 26$
      \item $5c + 8 - 2c = 3 \mod 26$
      \item $3c = -5 \mod 26$
      \item $3c = 21 \mod 26$
      \item Multiply by $3^{-1} \mod 26$:
        \begin{itemize}
          \item $9(3c = 21 \mod 26)$
          \item $c = 189 \mod 26$
          \item $c = 7 \mod 26$
          \item $c = 7$
        \end{itemize}
    \end{itemize}
  \item Plug in value of $c$ in (ii):
    \begin{itemize}
      \item $5(7) + 8d = 3 \mod 26$
      \item $35 + 8d = 3 \mod 26$
      \item $8d = -32 \mod 26$
      \item $8d = 20 \mod 26 \rightarrow 8d = 20 + 26n$
      \item $4d = 10 + 13n \rightarrow 4d = 10 \mod 13$
      \item Multiply by $4^{-1} \mod 13$ (calculated earlier to be 10):
        \begin{itemize}
          \item $10(4d = 10 \mod 13)$
          \item $d = 100 \mod 13$
          \item $d = 9 \mod 13$
          \item $d$ can also be $9 + 13 = 22$
          \item $d = 9, 22$
        \end{itemize}
    \end{itemize}
\end{itemize}

Thus, these are the possible encryption keys upon this inspection:

\[
\begin{pmatrix}
  6 & 7 \\
  7 & 9 \\
\end{pmatrix}, \begin{pmatrix}
  6 & 20 \\
  7 & 9 \\
\end{pmatrix}, \begin{pmatrix}
  6 & 7 \\
  7 & 22 \\
\end{pmatrix}, \begin{pmatrix}
  6 & 20 \\
  7 & 22 \\
\end{pmatrix}
\]

However, note that \{6, 20, 7, 9\} and \{6, 20, 7, 22\} do not have a corresponding inverse (decryption key) since their determinant is 18, which is not coprime with 26. Thus, once we remove these two possibilities, we are down to two possible encryption keys:

\[
\begin{pmatrix}
  6 & 7 \\
  7 & 9 \\
\end{pmatrix}, \begin{pmatrix}
  6 & 7 \\
  7 & 22 \\
\end{pmatrix}
\]

Now, we can try out these two keys to see if they encrypt the plaintext “FISH” to “IDBH”.
"FI" = \begin{pmatrix} 6 & 7 \\ 7 & 9 \end{pmatrix} = (6 \cdot 5 + 7 \cdot 8) = (86)_{107} mod_{26} = \begin{pmatrix} 8 \\ 3 \end{pmatrix} = "ID"

"SH" = \begin{pmatrix} 6 & 7 \\ 7 & 9 \end{pmatrix} = (6 \cdot 18 + 7 \cdot 7) = (157)_{189} mod_{26} = \begin{pmatrix} 1 \\ 7 \end{pmatrix} = "BH"

"FI" = \begin{pmatrix} 6 & 7 \\ 7 & 22 \end{pmatrix} = (6 \cdot 5 + 7 \cdot 8) = (86)_{211} mod_{26} = \begin{pmatrix} 8 \\ 3 \end{pmatrix} = "ID"

"SH" = \begin{pmatrix} 6 & 7 \\ 7 & 22 \end{pmatrix} = (6 \cdot 18 + 7 \cdot 7) = (157)_{280} mod_{26} = \begin{pmatrix} 1 \\ 20 \end{pmatrix} = "BU"

Hence, we can see that the only possible encryption key is:

\[
\begin{pmatrix} 6 & 7 \\ 7 & 9 \end{pmatrix}
\]

5. By hand, using the Hill cipher, encrypt the following plaintext, "OPENSESEME", with the following encryption key: \begin{pmatrix} 4 & 7 \\ 11 & 19 \end{pmatrix}.

Convert the given plaintext letters into number:

<table>
<thead>
<tr>
<th>O</th>
<th>P</th>
<th>E</th>
<th>N</th>
<th>S</th>
<th>E</th>
<th>S</th>
<th>E</th>
<th>M</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>15</td>
<td>4</td>
<td>13</td>
<td>18</td>
<td>4</td>
<td>18</td>
<td>4</td>
<td>12</td>
<td>4</td>
</tr>
</tbody>
</table>

"OP" = \begin{pmatrix} 4 & 7 \\ 11 & 19 \end{pmatrix} = (4 \cdot 14 + 7 \cdot 15) = (161)_{439} mod_{26} = \begin{pmatrix} 5 \\ 23 \end{pmatrix} = "FX"

"EN" = \begin{pmatrix} 4 & 7 \\ 11 & 19 \end{pmatrix} = (4 \cdot 4 + 7 \cdot 13) = (107)_{291} mod_{26} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} = "DF"

"SE" = \begin{pmatrix} 4 & 7 \\ 11 & 19 \end{pmatrix} = (4 \cdot 18 + 7 \cdot 4) = (100)_{274} mod_{26} = \begin{pmatrix} 22 \\ 14 \end{pmatrix} = "WO"

"SE" = \begin{pmatrix} 4 & 7 \\ 11 & 19 \end{pmatrix} = (4 \cdot 18 + 7 \cdot 4) = (100)_{274} mod_{26} = \begin{pmatrix} 22 \\ 14 \end{pmatrix} = "WO"

"ME" = \begin{pmatrix} 4 & 7 \\ 11 & 19 \end{pmatrix} = (4 \cdot 12 + 7 \cdot 4) = (76)_{208} mod_{26} = \begin{pmatrix} 24 \\ 0 \end{pmatrix} = "YA"

The ciphertext is \textbf{FXDFWOWOYA}
6. The following cipher text was encrypted using the ADFGVX cipher with the 6 x 6 key matrix shown below and the keyword "INSTRUCTION".

```
A  D  F  G  V  X
A  H  O  W  A  R  8
D  E  Y  6  U  D  I
F  N  G  T  3  Z  B
G  S  0  C  F  J  K
V  L  M  P  Q  V  X
X  1  2  4  5  7  9
```

Note: the entry in row 1 column 2 is the letter O, the entry in row 2 column 6 is the letter I, the entry in row 4 column 2 is the digit zero and the entry in row 6 column 1 is the digit one.

AADDFXDADFADFGAXDFXADFVXDAFDAAVGDGDXGVAXVDXG

The length of the given ciphertext is 44 and the length of the keyword is 11. This means that there will be full 4 rows of letters in the table below:

<table>
<thead>
<tr>
<th>I</th>
<th>N</th>
<th>S</th>
<th>T</th>
<th>R</th>
<th>U</th>
<th>C</th>
<th>T</th>
<th>I</th>
<th>O</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>11</td>
<td>1</td>
<td>10</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>A</td>
<td>D</td>
<td>D</td>
<td>V</td>
<td>A</td>
<td>G</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>X</td>
<td>G</td>
<td>A</td>
<td>G</td>
<td>A</td>
<td>D</td>
<td>A</td>
<td>V</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>D</td>
<td>A</td>
<td>V</td>
<td>D</td>
<td>F</td>
<td>X</td>
<td>D</td>
<td>A</td>
<td>A</td>
<td>V</td>
<td>X</td>
</tr>
<tr>
<td>A</td>
<td>X</td>
<td>G</td>
<td>X</td>
<td>D</td>
<td>G</td>
<td>D</td>
<td>X</td>
<td>D</td>
<td>X</td>
<td>A</td>
</tr>
</tbody>
</table>

Reading the table horizontally will give us:
FFADDVAGDDDGAGADAVFFFDADVDFXDAAXGXGXDGDGDXA

Breaking it up into pairs, we get:
FFADDDVAGDDDGAGADAVFFFDADVDFXDAAXGXGXDGDGDXA

Using the 6 x 6 key matrix:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VD:</td>
<td>M</td>
<td>FX:</td>
<td>B</td>
<td>DA:</td>
<td>E</td>
<td>AV:</td>
<td>R</td>
<td>XA:</td>
<td>1</td>
<td>XG:</td>
<td>5</td>
</tr>
<tr>
<td>XD:</td>
<td>2</td>
<td>GD:</td>
<td>0</td>
<td>XD:</td>
<td>2</td>
<td>XA:</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is the plaintext: **TODAYISSEPTEMBER152021**, “Today is September 15, 2021”