Encryption Using Matrices

Cryptography, the science of encrypting and deciphering messages written in secret codes, has played a vital role in securing information since ancient times. Julius Caesar employed what has become known as the Caesar Shift Cipher when encoding messages to communicate with his generals. Under this form of encryption technique, each letter in a message is substituted with the letter that was a certain number of places further down the alphabet. Caesar used a shift of three places, and so A is replaced by D, B is replaced by E, and so on. In modern history, the Nazis continued to use the presumably highly sophisticated Engima machine to encrypt their messages when they communicated, still unaware that three Polish mathematicians had already cracked the 'unbreakable codes' of the Engima machine and had provided the Allied Forces with the means to gain access to their top secrets. More recently, with millions of financial transactions conducted over the Internet daily, cryptography has become more important than ever.

Companies have begun to make online transactions more secure by installing encryption software to prevent sensitive information such as credit card numbers from falling into the wrong hands by utilizing unique properties of large prime numbers.

In this project you will build a matrix and its inverse and describe how the matrix can be used to encrypt a message in a step by step guide that would be given to someone 'in the field'. Your goal is to explain the process in such a way as to make it very easy to understand for someone wishing to utilize this same technique and to communicate with another person via this code.

The Project

Using whatever medium you would like (make a pamphlet, book, poster, etc.) make a content accurate, visually appeasing product that accomplishes the following:

1.) Describes in detail the process needed to take a message and encode that message using a matrix. (can use either a 2x2 or 3x3 matrix)
2.) Describes in detail the process needed to take an encrypted message and decode that message using inverse matrices. (can use either a 2x2 or 3x3 matrix)
3.) Uses extensive examples to demonstrate the techniques.
4.) Includes two practice exercise with solutions provided.

Grading Rubric

Projects will be graded as a quiz on the following criteria

	5 points	4 points	3 points	2 points	0 Points
Encoding Explained	Explanation is thorough and does and excellent job explaining the process for encoding	Explanation is accurate and provides a good overview of encoding	Explanation is accurate but does not do a good job explaining the process of encoding	Explanation of Encoding is inaccurate	No Encoding Explained
Decoding Explained	Explanation is thorough and does and excellent job explaining the process for decoding	Explanation is accurate and provides a good overview of decoding	Explanation is accurate but does not do a good job explaining the process of decoding	Explanation of Decoding is inaccurate	No Decoding Explained
Examples included	Examples are well thought out, developed and fit the explanation perfectly	Examples are given and fit the explanation	Some examples are included but may not be well thought out or fit explanations	Some Examples are included but are inaccurate	No examples given
Practice exercises	2 practice exercise included with initial matrix given and solutions well explained	2 practice exercise included with initial matrix given and solutions, explanation lacking	1 practice exercise included with initial matrix given and solutions well explained	1 practice exercise included with initial matrix given and solutions, explanation lacking or practice exercises are innacurate	No Practice exercises
Visual Product and creativity	Visually draws attention and the layout adds to the content presentation, clean and legible, 'piece of art', creative	Visually draws attention, clean and legible, creative	Visual is clean and legible	Some effort is given to produce a visual product	No effort to produce a visual presentation given
Totals					
				Total	
				X4	
				Final Score	