**CSCI 563 ASSIGNMENT 1**

**Problem 1:**

# a)

Number of 8-character passwords:

For [a-z], there are 26 possible characters.

For [A-Z], there are 26 possible characters.

For [0-9], there are 10 possible numbers.

Combining these character sets gives a total of 62 possible characters: 26 (for lowercase letters) + 26 (for uppercase letters) + 10 (for digits).

Each position in an 8-character password can be any of the 62 characters. As a result, the total number of 8-character passwords is:

62 × 62 × 62 × 62 × 62 × 62 × 62 × 62 = 62^8

62^8 = 218,340,105,584,896

So, there are 218,340,105,584,896 possible 8-character passwords.

# b)

On average, we would only need to explore half of the possible password space to find the correct password. On average, we'd need to test approximately 218,340,105,584,896**/**2 passwords.

Average number of guesses = 218,340,105,584,896**/**2 = 109,170,052,792,448 passwords Given that one guess takes a nanosecond, the average time required would be:

109,170,052,792,448 nanoseconds.

Since there are 1,000,000,000 (or 109) nanoseconds in a second, the average time required in seconds is:

109,170,052,792,448/1,000,000,000 = 109,170.052792448 seconds = 109,170 seconds (approx.

30.3 hours)

On average, it would take about 109,170 seconds (or approximately 30.3 hours) to guess the password using a brute-force method at the rate of one guess per nanosecond.

# Problem 2: a)

To perform vernam cipher we use XOR.

K = P  C

P: SECURE: 101 010 001 110 100 010

C: ICEICY: 011 001 010 011 001 111

K: 110 011 011 101 101 101: UIISSS

Ciphertext K: **UIISSS**

**b)**

P= K  C

K: YIICRE: 111 011 011 001 100 010

C: ICEICY: 011 001 010 011 001 111

P: 100 010 001 010 101 101: RECESS

Plaintext P: **RECESS**

**PROBLEM 3:**

# a)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | A | B | C |
| Image Files | D3.jpg  D4.png | rw |  |  |
| D5.gif | rw | r | r |
| Document Files |  |  |  |  |
| Document Files  Binary Files | D1.doc |  | r |  |
| D2.ppt |  | r |  |
|  | r | r | r |
|  |  |  |  |  |
|  |  |  |  |  |
|  | D6.exe |  | rwx |  |
| D7.exe | rx | rx | rx |
| D8.exe | rx | rx | rx |

# b)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | D1.doc | | |  |  |  | | --- | --- | --- | | D2.ppt |  | D3.jpg | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | D4.png |  | D5.gif |  | D6.exe |  | D7.exe |  | D8.exe | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | **A: rw**  **B: r**    **C: r** | | |  | | --- | | **B: r** | | |  | | --- | | **A: rw** | | |  | | --- | | **A: r**  **B: r**    **C: r** | | |  | | --- | | **B: rwx** | | |  | | --- | | **A: rx**  **B: rx**    **C: rx** | | |  | | --- | | **A: rx**  **B: rx**    **C: rx** | |

**B:r**

# C)

|  |
| --- |
| D2.ppt: r  D3.jpg: r  D4.png: r  D5.gif: r  D6.exe: r w x  D7.exe: r x  D8.exe: r x |

**User**

**A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **User**    **B** | | |  | | --- | | D1.doc: r w  D2.ppt: r w  D5.gif: r  D7.exe: r x  D8.exe: r x | | |
|  | |  | |

|  |  |  |
| --- | --- | --- |
| **User**    **C** | |  | | --- | | D2.ppt: r  D5.gif: r  D7.exe: r x  D8.exe: r x | |

**Problem 4:**

# a)

1. Symbolic permission: `-rw-r ---- `

1. Numeric permission: `0640`

# b)

1. Symbolic permission: `drwxrwxr-x`

1. Numeric permission: `0775`

# C)

1. Symbolic permission: `-rwxr-sr-x`

1. Numeric permission: `2775`

# d)

1. Symbolic permission: `drwxrwxrwt`

1. Numeric permission: `1777`

# e)

1. Symbolic permission: `-rwsr-xr-x`

1. Numeric permission: `4755`