CSE3140 — Lab 3

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Deliverables

Part 1

In order to find the file with the matching SHA256 checksum, we wrote a short Python script to iterate through all files in *Q1files* and report their checksums:

```
import os

h = "04ebf0f4fe539ed72643bd01546aeaf372fdc1bd558e92afcc8c6078d4e5becd"

print(f"Looking for matches: {h}")

for file in os.listdir("./Q1files"):
    if os.path.isfile(os.path.join("./Q1files", file)):
        sha256sum = os.system("sha256sum " + os.path.join("./Q1files", file))
```

This script found that *disesteem.exe* had the matching checksum that was in our *Q1hash* file.

Part 2

In order to find the file with the matching SHA256 checksum, we very slightly modified the Python script from Part 1 to stop and report which file actually matches the checksum. The script is shown below:

```
import os
import subprocess

h = "5c01e943db42684800123d6b1598c7e9efbc8e9050becaec1c4536f6e1c50907"

for file in os.listdir("./Q2files"):
    if os.path.isfile(os.path.join("./Q2files", file)):
        sha256sum = subprocess.check_output(["sha256sum", os.path.join("./Q2files", file)])
        if h in sha256sum.decode("utf-8"):
            print(f"Hash matches file {file}")
            break
```

The script found that *appelidage.exe* had the matching checksum that was in our *Q2hash* file.

Part 3

In order to find the file correctly signed with the given private key, we wrote a short Python script to iterate through all files in *Q3files*, and verify each of their signatures against the known public key's signature. The script is shown below:

```
import os
from Crypto.Hash import SHA256
from Crypto.PublicKey import RSA
from Crypto.Signature import PKCS1_v1_5

key = RSA.import_key(open("./PublicKey.pem", "rb").read())

for file in os.listdir("./Q3files"):
    if os.path.isfile(os.path.join("./Q3files", file)):
        with open(os.path.join("./Q3files", file), "rb") as f:
            data = f.read()
        digest = SHA256.new(data)
        try:
            PKCS1_v1_5.new(key).verify(digest, data)
            print(f"Signature match: {file}")
            break
        except (ValueError, TypeError):
            print(f"Signature does not match file {file}")
```

The script found that *monoclinic.exe.sign* was signed with the given private key, and by extension *monoclinic.exe* was the signed binary associated with the given signatures files.

Part 4

In order to decrypt the given ciphertext, we wrote a short Python script which utilized the given AES encryption key in order to decrypt the file using the PyCryptodome module. The script is shown below:

```
from Crypto.Cipher import AES
from Crypto.Util.Padding import unpad
from Crypto.Random import get_random_bytes

file_in = open('encrypted4.txt', 'rb')
iv = file_in.read(16)
original_data = file_in.read()
file_in.close()
file_in = open('.key.txt', 'rb')
variable = file_in.read()
file_in.close()

cipher = AES.new(variable, AES.MODE_CBC, iv=iv)
ciphered_data = cipher.decrypt(original_data)
print(ciphered_data)

file_out = open('Q4a', "wb")
file_out.write(cipher.iv)
file_out.write(ciphered_data)
file_out.close()
```

The decrypted contents of the file are shown below:

```
triumphum
rougish
```

Part 5

Pending

Part 6

Pending