

# HTB Uni CTF - Finals 2021 - Missing Pieces write-up

## hur - SIGINT

*There is serious suspicion that John is a double agent. We found the cipher in his trash can. It looks like he extracted the message and forgot to get rid of the evidence. Can you decrypt the secret message?*

The given message contains several lists of integers like the one below:

```
[55, 133, 164, 201, 109, 252, 68, 178, 7, 42, 177, 60, 39, 59, 47, 198, 195, 163,
6, 78, 233, 26, 132, 160, 95, 124, 157, 34, 87, 80, 82, 147, 41, 63, 162, 143,
48, 84, 141, 13, 221, 227, 107, 74, 208, 105, 241, 218, 67, 226, 12, 232, 8, 185,
119, 190, 211, 73, 254, 180, 214, 115, 174, 223, 43, 200, 66, 247, 0, 138, 58,
32, 175, 86, 56, 179, 85, 52, 239, 150, 70, 11, 61, 246, 54, 165, 148, 5, 204,
151, 167, 197, 27, 236, 207, 1, 182, 36, 38, 137, 240, 30, 181, 69, 101, 99, 10,
18, 152, 106, 97, 136, 116, 98, 193, 215, 76, 35, 237, 166, 206, 79, 222, 170,
230, 14, 189, 3, 89, 213, 25, 112, 102, 62, 145, 126, 21, 53, 250, 45, 33, 212,
191, 243, 149, 29, 154, 88, 209, 171, 118, 144, 192, 81, 251, 125, 234, 135, 100,
173, 139, 123, 16, 128, 37, 187, 216, 104, 134, 93, 57, 44, 140, 22, 65, 146,
186, 202, 183, 245, 9, 131, 103, 91, 142, 50, 122, 203, 184, 220, 77, 129, 114,
219, 31, 196, 20, 155, 238, 217, 111, 2, 188, 113, 24, 199, 40, 117, 224, 176,
75, 253, 96, 4, 255, 120, 172, 248, 92, 235, 110, 244, 130, 28, 23, 64, 225, 228,
127, 83, 231, 46, 168, 108, 229, 17, 19, 49, 94, 242, 158, 51, 194, 210, 169,
121, 15, 205, 71, 159, 153, 156, 249, 90, 161]
```

I quickly notice 2 things about the lists. The integers are within 0-255, and the lists do not seem to contain duplicates. The title "Missing pieces" hints at finding something that's missing.

We can find the missing integer in the range by summing the numbers up and subtracting that from the sum of numbers in the range [1, 255]. I wrote a quick Python solution:

```
# inp is the given input wrapped in a list
s = sum(range(256))
res = []
for i in inp:
    s2 = sum(i)
    c = s - s2
    res.append(c)

print(''.join(chr(i) for i in res))
```

Converting all the missing integers to characters gives us the flag!

```
[15:58] atte@vk-3:missing_pieces $ python3 soln.py
HTB{m1551ng_v4lu35_m4k3_m3_s1ck}
```