finals-simulator

Let's look at the decompiled output.

```
puts("Welcome to Finals Simulator 2023: Math Edition!");
printf("Question #1: What is sin(x)/n? ");
fflush(stdout);
fgets(userinput,0x100,stdin);
sVar2 = strcspn(userinput,"\n");
userinput[sVar2] = '\0';
iVar1 = strcmp(userinput,"six");
if (iVar1 == 0) {
  printf("Question #2: What\'s the prettiest number? ");
  fflush(stdout);
  __isoc99_scanf("%d",&local_11c);
  if ((local_11c + 88) * 42 == 561599850) {
    printf("Question #3: What\'s the integral of 1/cabin dcabin? ");
    fflush(stdout);
    getchar();
    fgets(userinput,256,stdin);
    sVar2 = strcspn(userinput,"\n");
    userinput[sVar2] = '\0';
    for (local_10 = userinput; *local_10 != '\0'; local_10 = local_10 + 1) {
      *local_10 = (char)((long)(*local_10 * 17) % 253);
    }
    putchar(10);
    iVar1 = strcmp(userinput,enc);
    if (iVar1 == 0) {
      puts("Wow! A 100%! You must be really good at math! Here, have a flag as a reward.");
      print_flag();
    }
    else {
      puts("Wrong! You failed.");
    }
  }
```

For the first question, we just enter the string "six".

For the second question, we can obtain the answer by calculating:
res = (561599850 / 42) – 88 = 13371337

For the third question, we can store the encrypted values as an array and run the calculation through all printable ASCII characters (+ space), for each value in the array.

```
import math

arr = [0x0e, 0xc9, 0x9d, 0xb8, 0x26, 0x83, 0x26, 0x41, 0x74, 0xe9, 0x26, 0xa5, 0x83, 0x94, 0x0e, 0x63, 0x37, 0x37, 0x37, 0x00]
for item in arr:
    for num in range(0x20, 0x7e): # printable ASCII + space
        res = (num * 0x11) % 0xFD
        if res == item:
            print(chr(num), end = "")
            continue
```

And we get:

```
┌──(kali㉿kali)-[~/NYU_OffSec/LACTF/finals]
└─$ python3 calc.py
it's a log cabin!!!
```

Enter the answers to the questions and get the flag.

```
┌──(kali㉿kali)-[~/NYU_OffSec/LACTF/finals]
└─$ python3 exploit.py
[+] Opening connection to lac.tf on port 31132: Done
[DEBUG] Received 0x4f bytes:
    b'Welcome to Finals Simulator 2023: Math Edition!\n'
    b'Question #1: What is sin(x)/n? '
[DEBUG] Sent 0x4 bytes:
    b'six\n'
[DEBUG] Received 0x2a bytes:
    b"Question #2: What's the prettiest number? "
[DEBUG] Sent 0x9 bytes:
    b'13371337\n'
[DEBUG] Received 0x34 bytes:
    b"Question #3: What's the integral of 1/cabin dcabin? "
[DEBUG] Sent 0x14 bytes:
    b"it's a log cabin!!!\n"
[+] Receiving all data: Done (131B)
[DEBUG] Received 0x83 bytes:
    b'\n'
    b'Wow! A 100%! You must be really good at math! Here, have a flag as a reward.\n'
    b'lactf{im_n0t_qu1t3_sur3_th4ts_h0w_m4th_w0rks_bu7_0k}\n'
[*] Closed connection to lac.tf port 31132
b'\nWow! A 100%! You must be really good at math! Here, have a flag as a reward.\nlactf{im_n0t_qu1t3_sur3_th4ts
_h0w_m4th_w0rks_bu7_0k}\n'
```