

Year 10 Interleaved Homework 17

Ethan Armstrong

This task is not about how much you can remember; it may require you to use the course website to help you answer some questions.

1. Python Program Analysis

```
1. width = int(input("Enter width:/t"))
2. height = int(input("Enter height:/t"))
3. colours = int(input("Enter number of bits in each pixel:/t"))
4.
5. bits = (width * height) * colours
6. bytes = bits / 8
7.
8. print(f"number of bits is: {bits}, number of bytes is: {bytes}")
```

a. Why is the data type int appropriate for all inputs in this program?

Because we are only expecting number inputs as they will be multiplied and divided later

b. What does the symbol '/' mean on line 6?

Divide

c. What is the purpose of the above program?

Calculate the file size of an image

d. How could you extend this program further?

Convert the file size into Bytes and KiloBytes

2. Match the definition with the key term

- **Lossy Compression** → Makes the file smaller by removing data to store the file.
- **Iteration** → Loops in code that allow the same lines to be run multiple times to save rewriting the same thing.
- **Huffman Encoding** → A compression algorithm that is particularly effective for text. It constructs a tree using the character and its frequency within the text.
- **Array** → A list of items within a program.

3. Complete the following conversions (show all your working):

a. Convert **450,000 bits** into KiloBytes

$$450,000 / 8 = 56250$$

$$56250 / 1000 = 56.25$$

b. Convert **10 TB** into MB

$$10 * 1000 = 10,000GB$$

$$10000 * 1000 = 10,000,000 MB$$

c. Convert **7 MB** into bits

$$7 * 1000 = 7000B$$

$$7000 * 8 = 56000b$$

4. Sound File Calculations

Figure 1 shows a sound wave.

a. Complete the below equation for calculating the size of a sound file:

File size = sample rate × sample resolution × duration

b. The sound lasts for 2 minutes and is recorded at a rate of 4000Hz with a resolution of 8 bits.

Calculate the file size of the sound in Bytes, show all your working:

$120 * 4000 * 8 / 8$ $12*4 = 48$ 480,000 Bytes

c. Define the term **sample rate**:

The amount of times in a second a sample is taken

d. Describe the effect of **increasing the sample resolution**:

Increase in file size

5. Write a Python program to calculate the total size of a sound file

The units required are:

- Bits
- Bytes
- Kilobytes

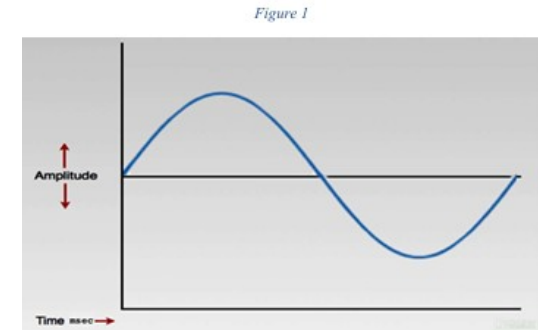
The program should:

- Get the user to input the required values to calculate the file size.
- Ask the user if they would like to calculate another file's size.
- Loop or exit

appropriately based on the decision above.

Output the total file size in the required units.

Ensure to apply proper indentation, use meaningful variable names, and adhere to Python syntax in your response.



```
1. def bitstobytes(bits):
2.     return bits/8
3.
4. def bytestokb(bytes):
5.     return bytes/1000
6.
7. def getintinput(prompt=""):
8.     while True:
9.         val = input(prompt)
10.         if val.lower() == "exit":
11.             return None
12.         else:
13.             try:
14.                 return int(val)
15.             except:
16.                 continue
17.
18. print("Input 'exit' at any point to exit this program")
19.
20. while True:
```

```
21.     rate = getintinput("Enter sample rate")
22.     if rate is None: break
23.     resolution = getintinput("Enter sample resolution")
24.     if resolution is None: break
25.     duration = getintinput("Enter duration in seconds")
26.     if duration is None: break
27.
28.     size_choice = 0
29.     while size_choice not in range(1, 4):
30.         size_choice = getintinput("Pick a number\n1=size in
bits\n2=size in bytes\n3=size in kilobytes")
31.
32.     final_size = rate * resolution * duration
33.
34.     if size_choice >= 2:
35.         final_size = bitstobytes(final_size)
36.
37.     if size_choice >= 3:
38.         final_size = bytestokb(final_size)
39.
40.     print(f"Size in selected choice: {final_size}")
41.
```