CSCI 145 Quiz 8 practice questions on representing values and data

1. Convert each number. The binary numbers are unsigned: every place is positive, as in Lecture 15. No calculator needed.

   `11010` in decimal _____ 52 in binary _____

   `10010011` in decimal _____ 83 in binary _____

2. Add these two unsigned binary numbers. Write each carry in the box above its column, and the sum in the boxes below.

   carries | | | | | |

   ```
     1 1 1 0
   + 0 0 1 1
   ```

   sum | | | | | |

3. Answer each question with a number. All the numbers are unsigned: 0 and up.

   a) How many different patterns can 6 bits hold? _____

   b) What is the largest unsigned whole number 6 bits can hold? _____

   c) What is the fewest bits that can hold every unsigned whole number from 0 to 300? _____

4. Convert each unsigned number. Use the hex table on the reference sheet.

   7D (hex) in decimal _____ `10101100` in hex _____

   E3 (hex) in decimal _____ 5E (hex) in binary _____

5. Colors.

   a) Write #2E8B57 as a (red, green, blue) tuple.

   (_____ , _____ , _____)

   b) Write `(255, 20, 147)` as a hex color code.

   # _____

6. Write the value Python gives for each expression. Put quotes around a string.

   `bin(12)` _____ `hex(60)` _____

   `int("11100", 2)` _____ `int("B4", 16)` _____

   `0x2C` _____ `0b101 * 2` _____

7. Each bit sequence is a signed 8-bit two's complement number. Write it in decimal.

   `11101100` _____ `01011010` _____ `10000110` _____

8. Write each number in signed 8-bit two's complement. Show your work.

   a) `-58`

   b) `-7`

9. Which number can't be stored in signed 8-bit two's complement?

   A. 127 B. 128 C. -128 D. -1

10. Write True or False for each.

    a) `0.25 + 0.125 == 0.375` _____

    b) `0.1 + 0.7 == 0.8` _____

    c) A float can store every number between 0 and 1 exactly. _____

    d) A 64-bit float can store a number bigger than 2^{64}. _____

11. What happens when this code runs?

```
fuel = 0.5
while fuel != 0:
    fuel = fuel - 0.1
print("empty")
```

    A. It prints `empty` after 5 passes through the loop
    B. It prints `empty` after 6 passes through the loop
    C. It never stops
    D. It never runs the loop body

12. Write the value Python gives for each expression. Put quotes around a string. Use the ASCII table on the reference sheet.

`ord("K")`	_____	`chr(100)`	_____
`chr(ord("b") + 3)`	_____	`ord("7") - ord("0")`	_____
`"Dog" < "cat"`	_____	`chr(0x7A)`	_____

13. These hex bytes are ASCII codes. What word do they spell?

    4A 61 7A 7A _____

14. Write a function `count_ones(num)` that returns how many 1s there are when the whole number `num` is written in binary. Don't use `bin`. If `num` is 0, it returns 0. Otherwise, it returns the number of 1 bits. Do not include a docstring. For example:

```
>>> count_ones(25)   # 11001
3
>>> count_ones(8)    # 1000
1
>>> count_ones(0)
0
```