CS 161 Winter 2020 Practice Final Exam Questions: Structs and Recursion

Review the questions on Midterms 1 and 2 (and the associated review questions) for content through week 7.

Additional questions on structs and recursion (weeks 8 and 9) follow.

Use this struct definition for questions 1 through 5:

```
struct animal {
  int n_eyes;
  float weight;
  string name;
};
```

1. Given the following declaration:

```
animal* deer = new animal;
```

Choose the statement that will set the deer's number of eyes to 1.

   A. `deer.n_eyes = 1;`
   B. `animal.n_eyes = 1;`
   C. `deer->n_eyes = 1;`
   D. `(&deer).n_eyes = 1;`

2. Given the following declaration:

```
animal bear = { 2, 17.5, "bear" };
```

Choose the statement that will print the bear's weight.

   A. `cout << bear.weight << endl;`
   B. `cout << animal.weight << endl;`
   C. `cout << bear->weight << endl;`
   D. `cout << (&bear).weight << endl;`

3. Given the following declaration:

```
animal* farm = new animal[20];
```

Choose the statement that will set the name of the animal at index 2 to "pig".

   A. `&farm[2].name = "pig";`
   B. `farm[2].name = "pig";`
   C. `animal[2].name = "pig";`
   D. `farm[2]->name = "pig";`

4. Given two `animal` variables named `fox` and `badger`, choose the expression that evaluates to true if the badger weighs more than the fox.

   A. `fox > badger`
   B. `badger > fox`
   C. `fox.weight > badger.weight`
   D. `badger.weight > fox.weight`

5. (A: True, B: False) A recursive function cannot use a `for` loop inside its definition.

6. (A: True, B: False) The **base case** describes the condition in which the recursion stops.

7. Assume that you want to write a recursive function that prints every letter from character c down to `'a'`:

```
void print_letters(char c) {
  if (_______①________)
    cout << c << endl;
  else {
    cout << c << " ";
    __________②_____________;
  }
```

What would be an appropriate base case to go in the blank marked ①?

A. `c == 0`
B. `c != 0`
C. `c == 'a'`
D. `c != 'a'`

8. Given the same task as in question 7, select the best recursive call to go in the blank marked ②.

A. `print_letters(c);`
B. `print_letters(c-1);`
C. `print_letters('c');`
D. `print_letters();`

9. Given this definition of function `play()`:

```
float play(int x) {
  if (x == -1)
    return 1.5;
  else {
    return 3.6 + play(x-1);
  }
}
```

What will `play(0)` return?

A. 3.6
B. 5
C. 5.1
D. 6.6

10. Given the definition of function `play()` in question 9, how many times will the function `play()` be called, if we start by calling `play(2)`?

A. 1
B. 2
C. 3
D. 4