CSCI 135 - Test 1

Name: _____
ID: _____

Section: _____

Instructions

- READ THESE DIRECTIONS!
- Clear your desk before the test (including any cellphones, electronic devices, etc.)
- Do not open this exam before you are told to do so.
- This is a closed-book closed-notes test.
- You may not use constructs not covered in this test. This means no arrays or later (and no gotos), or features specific to some C++ version.
- The only library functions you are allowed to use are:
  - cmath, climits, cstdlib: all
  - String: empty, length, concatenation, indexing/at, relational operators
  - iostream: <<, >>, getline (with cin, cout, cerr)
  - fstream: all of above, open, close, eof, fail
- Budget your time well. The questions are not necessarily in order of difficulty!

1. (9%) Suppose your program has the following declarations to represent information about a person:

```
string name;     // possibly empty
int    age;
bool   female;   // true if female, false if male
```

Write C++ *conditions* corresponding to each of the following sets. Your answers should be as compact as possible (and cover all cases).

(a) Males who are teenagers or senior citizens (a senior citizen is one who is at least 65 years old).

(b) Females whose names start with the letters `ja`.

(c) Males whose names end in the letter `n`.

2. (15%) Consider the following program fragment:

```
int main() {
  int foo (int a, int & b);
  int s=0;    // SPECIAL LINE
  cout << s++; cout << ++s; cout << s++ << endl;
  s = 5;
  for (int k=1; k<3; k++)
    cout << foo(k,s);
  return 0;
}
int foo (int s, int &t) {
  static int x = 1;
  x++;
  t += 2;
  return s*t*x;
}
```

(a) What does the program output?

(b) Circle all actual arguments in the program.

(c) Underline all formal parameters in the program.

(d) Draw a dashed box around all prototypes in the program.

(e) Draw a solid box around the scope of the variable declared on SPECIAL LINE?

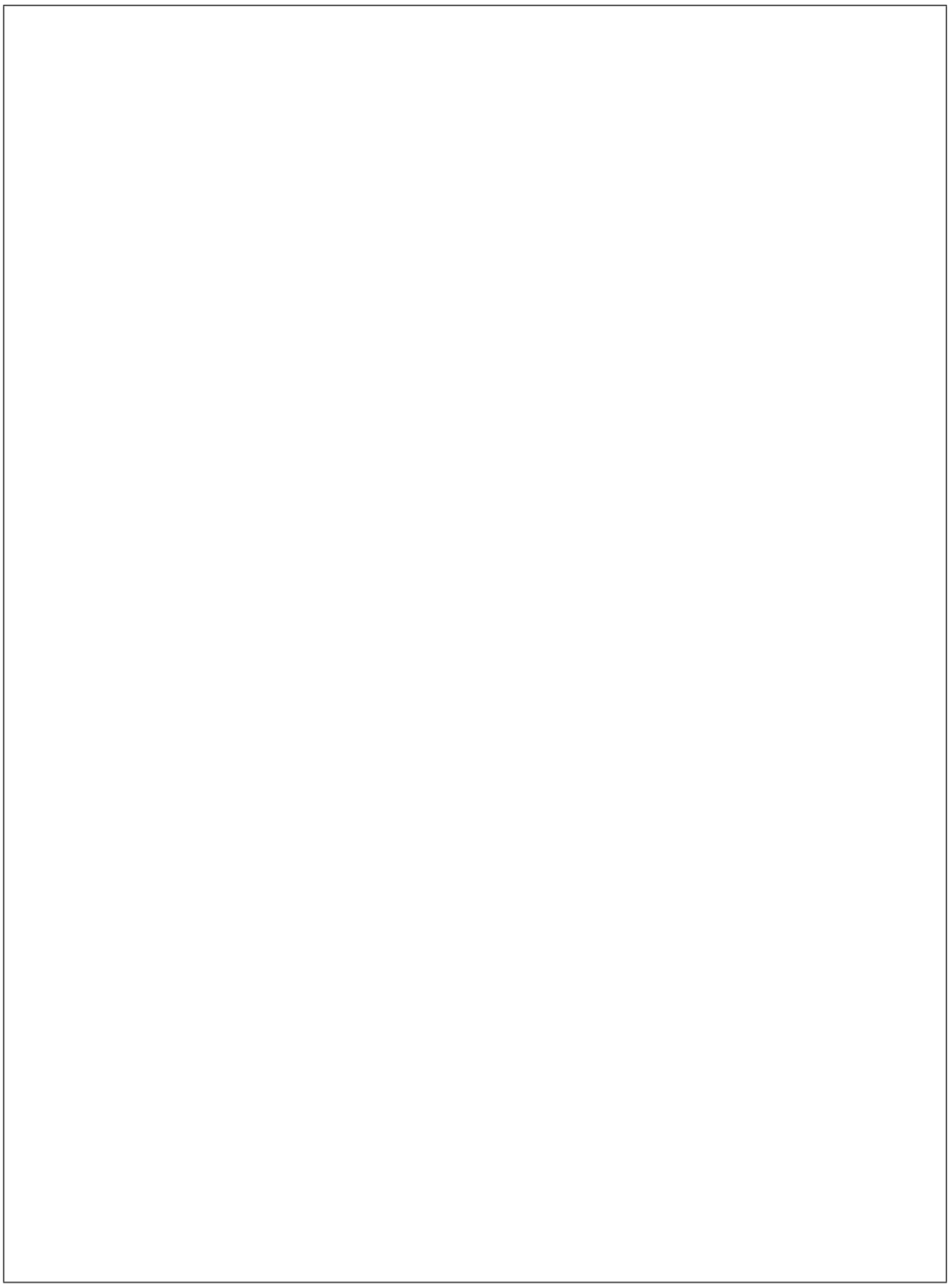
3. (12%) Write a function that takes a number k as argument and returns k with bit 2 set to 1 and bit 3 set to 0. For example, if $k = 17_{10} (= 00 \ldots 010001_2)$, it would return $k = 21_{10} (= 00 \ldots 010101_2)$. Use the prototype `int setBits(int k)`.

4. (4%) You wish to write a function that does the same as Problem 3, except that it does not return anything but mutates (*i.e.*, modifies) k instead. State an appropriate prototype for this function. You do not need to implement this function.

5. (16%) Write a code fragment that computes the time you get to class given a current time in hours and minutes (24 hour format), and a commute time in minutes. The computed time should be stored in the variables classHrs and classMins. Your program should work for all legal values of arguments of course. Use the following declarations:

```
// Precondition: 0 <= curMins < 60   0 <= curHrs < 24
int curHrs, curMins;       // current time
unsigned int comMins;      // commute time
int classHrs, classMins; // arrival time
```

6. (22%) Write a program fragment that inputs a sequence of integers from the keyboard, terminating when the same integer is input twice consecutively. The fragment outputs the following: the average of the inputs, the 2nd largest input, and a count of how many inputs are even. The first (but not the second) of the two copies of the final input should be factored into these statistics. You do not need to output any prompts or any messages other than the above, and you may assume that the inputs are distinct. You may also assume that there are at least 2 inputs and the first 2 inputs are not among the 2 largest.



7. (22%) Write a function with prototype `string foo(string w)` that returns a string that has 1 copy of character 0 of `w`, 2 copies of character 1, and so on, until a space character is reached. For example, if `w` is "the snow", your function would return "thheee". You may assume the precondition that `w` contains a space. Don't forget that you may only use those string library functions mentioned on the cover page.