**Question 1 - checkbox, shuffle, partial credit**

This test is meant to test your knowledge of C programming and some basic computer science-related skills you will need to do well in this class. The outcome of the test is for your use only; it will not affect whether you can register for the class, and it will not apply to your grade if you do register. As such, we recommend that you do not research the answers on the Internet, but answer the questions to your best recollection.

Consider the following variable declaration for $$\color{red}{\verb|bar|}$$ in the function $$\color{red}{\verb|foo|}$$

void foo() { char bar[128]; ... }

Which of the following are true?

\*A: Holds 128 elements

B: All elements are initialized to 0

Feedback: Local variables provide no guarantees about initialization.

C: bar[1] contains the first element

Feedback: Array indexing starts at 0 in C.

**Question 2 - multiple choice, shuffle**

Consider the following code fragment: $$\color{red}{\verb|sizeof(int\*) == sizeof(int)|}$$. Which one of the following is true about it?

A: This fragment always evaluates to 1 (assuming it doesn't crash)

Feedback: While often true, there is no guarantee it will be.

B: This fragment always evaluates to 0 (assuming it doesn't crash)

C: This fragment will always crash

\*D: This fragment's result depends on the compiler and architecture

Feedback: This is the best answer.

E: This fragment will not compile

**Question 3 - multiple choice, shuffle**

Suppose you are compiling for a 32-bit platform and $$\color{red}{\verb|sizeof(int) == 4|}$$. Which one of the following is equivalent to $$\color{red}{\verb|c[b]|}$$ if $$\color{red}{\verb|c|}$$ is of type $$\color{red}{\verb|int\*|}$$ and $$\color{red}{\verb|b|}$$ is of type $$\color{red}{\verb|int|}$$?

A: \*c+b

Feedback: This reads c[0] and then adds b to it

\*B: \*(c+b)

C: c[b][0]

Feedback: This reads c[b] and then attempts to use the result as a pointer

D: -1 \* b[c]

Feedback: This treats b as a pointer, which it is not.

E: none of the above

**Question 4 - checkbox, shuffle, partial credit**

Consider the following program.

#include <string.h> int foo(void) { char bar[128]; char \*baz = &bar[0]; baz[127] = 0; return strlen(baz); }

What are possible outcomes from running this function? Check all that apply (note that the outcomes shown are not exhaustive):

A: crash

B: returns 128

Feedback: The zero terminator at the last position is not considered part of the length.

\*C: returns 127

Feedback: If the uninitialized variable contains all non-zeroes, then the string will be zero-terminated by the bar[127] = 0 statement

\*D: returns 0

Feedback: The uninitialized variable could have a 0 at bar[0], which would make its length 0.

E: returns -1

**Question 5 - multiple choice, shuffle**

Consider the following code fragment.

char blah[] = "fizzbuzz"; printf("%s\n", blah+4);

What happens if we try to compile and run this code?

A: The program is illegal C and may not compile

B: The program outputs "fizz"

\*C: The program outputs "buzz"

D: The program outputs a blank line depending on the size of pointers

**Question 6 - checkbox, shuffle, no partial credit**

Which of the following are true of memory returned via the malloc function? Check all that apply.

A: The memory is zero-initialized

B: It is automatically released by the operating system when the pointer to which the memory is assigned goes out of scope

\*C: It must be manually released by the programmer

D: It is write-only

**Question 7 - multiple choice, shuffle**

Consider the following code

#include <stdio.h> #include <stdlib.h> int main(int argc, char \*argv[]) { unsigned int i; unsigned int k = atoi(argv[1]); char \*buf = malloc(k); /\* 1 \*/ if(buf == 0) { return -1; } for(i = 0; i < k; i++) { buf[i] = argv[2][i]; /\* 2 \*/ } printf("%s\n", buf); /\* 3 \*/ return -1; }

A: This program could crash at position 1

B: This program could crash at position 2

Feedback: It also crashes at 3

C: This program could crash at position 3

Feedback: It also crashes at 2

D: This program could crash at 1 and 2

Feedback: It crashes at 2, but not 1

\*E: This program could crash at 2 and 3

F: This program could crash at all 3 positions

Feedback: It crashes at 2 and 3, but not 1

**Question 8 - checkbox, shuffle, partial credit**

Which of the following are true statements about the program stack?

\*A: It is used to store local variables while executing a function

B: Management of the stack is handled automatically by the architecture

C: It is used to store global variables while executing a function

D: It is used as the source of memory returned by malloc()

**Question 8 - checkbox, variation 1, shuffle, partial credit**

Which of the following are true statements about the program stack?

\*A: It is used to store local variables while executing a function

B: It is used to store global variables while executing a function

C: It is used as the source of memory returned by malloc()

\*D: The stack is managed by code emitted by the compiler

**Question 9 - checkbox, shuffle, partial credit**

Which of the following are true of the X86 call instruction?

\*A: Pushes the instruction pointer value onto the stack

B: Pushes flag registers onto the stack

\*C: Branches to a specified address

\*D: Its target address may be specified in a general-purpose register

**Question 10 - multiple choice, shuffle**

Consider the following program

#include <stdlib.h> #include <stdio.h> #include <string.h> int main(int argc, char \*argv[]) { int \*\*blah2 = malloc(sizeof(int\*)\*N); int \*special = NULL; int i, j; for(i = 0; i < N; i++) { int \*tmp = (int \*)malloc(sizeof(int)\*M); memset((void \*)tmp, 0, sizeof(int)\*M); if(i > N) { special = &tmp[3]; } blah2[i] = tmp; } if(special != NULL) { \*special = 7; } for(i = 0; i < N; i++) { for(j = 0; j < M; j++) { printf("%d ", blah2[i][j]); } printf("\n"); } return 0; }

Assuming we $$\color{red}{\verb|#define N|}$$ and $$\color{red}{\verb|M|}$$ to be positive integers, and the calls to $$\color{red}{\verb|malloc()|}$$ succeed (the arguments do not overflow, and do not return $$\color{red}{\verb|NULL|}$$), then which of the following is true?

A: This is not a valid C program

B: This program crashes

C: This program outputs a random NxM matrix

\*D: This program outputs a zero NxM matrix

E: This program outputs a matrix with at least one element being 7

**Question 11 - multiple choice, shuffle**

What is TCP?

\*A: It is a protocol that supports reliable data transfer on the Internet

B: It is a protocol often implemented on top of HTTP

C: It is connectionless

D: It ensures data confidentiality

**Question 12 - multiple choice, shuffle**

What is PHP? Pick one.

A: A network protocol

B: The acronym for a coding standard

\*C: A programming language often used to implement web sites

D: A programming language often used to implement network switches

**Question 13 - checkbox, shuffle, partial credit**

Which of the following statements about HTML are true?

\*A: Web browsers render HTML content served by web sites

B: HTML is a kind of URL

\*C: HTML is a text-based format (as opposed to a binary format)

\*D: HTML documents have tags that identify different sorts of data

**Question 14 - multiple choice, shuffle**

What is gcc?

A: An interpreter

\*B: A compiler

C: A virtual machine

D: All of the above

**Question 15 - multiple choice, shuffle**

The shell command cd; ls \*.xml

A: Will list all files ending in the xml suffix in the previous working directory

\*B: Will list all files ending in the xml suffix in user's home directory

C: Will list the file \*.xml in the current directory

D: Will list all of the files listed in the given XML file