CS 470 Problem Set 07

# Exercises

1. In your own words, define each of the following terms:
   1. Stack division of memory
   2. Heap division of memory
   3. Code division of memory
   4. Frame pointer
   5. Stack pointer
2. Describe in your own words how is allocation and freeing implemented in heap functions such as malloc/new and free/delete

# Problems

## Please start from the following representation of the call stack and the heap. Note that you will not need to draw the heap until #3.4. If a pointer exists in the call stack or the heap, please indicate where it points with an arrow. If a value exists in the call stack or the heap, please place that value in the corresponding memory location.

Hint: Draw this in a sheet of paper and take a picture with your phone. Insert the picture here:

3.1. After two local variables are declared in main() :

int main()

{

int integer = 42;

bool boolean = true;

//////// Problem 3.1 ////////////////

3.2. After three local variables are declared in function1()

// address: 0x4010000

void function1()

{

char text[8] = "Hello";

int num1 = 10;

int num2 = 20;

//////// Problem 3.2 ////////////////

3.3. At the end of function3()

// address: 0x4030000

void function3(char \* pointer,

int value,

int & reference)

{

\*pointer = 'X';

value = 99;

reference = 9999;

//////// Problem 3.3 ////////////////

3.4. After three local variables are declared in function2()

// address: 0x4020000

void function2()

{

int \* p1 = NULL;

char \* p2 = NULL;

float \* p3 = NULL;

//////// Problem 3.4 ////////////////

3.5. After p1 is allocated in function2()

// address: 0x4020000

void function2()

{

int \* p1 = NULL;

char \* p2 = NULL;

float \* p3 = NULL;

p1 = new int[32];

//////// Problem 3.5 ////////////////

3.6. After p2 and p3 are allocated in function2()

// address: 0x4020000

void function2()

{

int \* p1 = NULL;

char \* p2 = NULL;

float \* p3 = NULL;

p1 = new int[32];

p2 = new char[60];

p3 = new float[8];

//////// Problem 3.6 ////////////////

3.7. After p2 is deleted in function2()

// address: 0x4020000

void function2()

{

int \* p1 = NULL;

char \* p2 = NULL;

float \* p3 = NULL;

p1 = new int[32];

p2 = new char[60];

p3 = new float[8];

delete [] p2;

//////// Problem 3.7 ////////////////

3.8. After p2 is allocated again in function2()

// address: 0x4020000

void function2()

{

int \* p1 = NULL;

char \* p2 = NULL;

float \* p3 = NULL;

p1 = new int[32];

p2 = new char[60];

p3 = new float[8];

delete [] p2;

p2 = new char[70];

//////// Problem 3.8 ////////////////