CS 5008: In-class Activity (Pointers)

Create a group of 3-4 persons. Write down the group's consensus answers to the questions on one sheet. The other sheets can be kept as lecture notes for the group members.

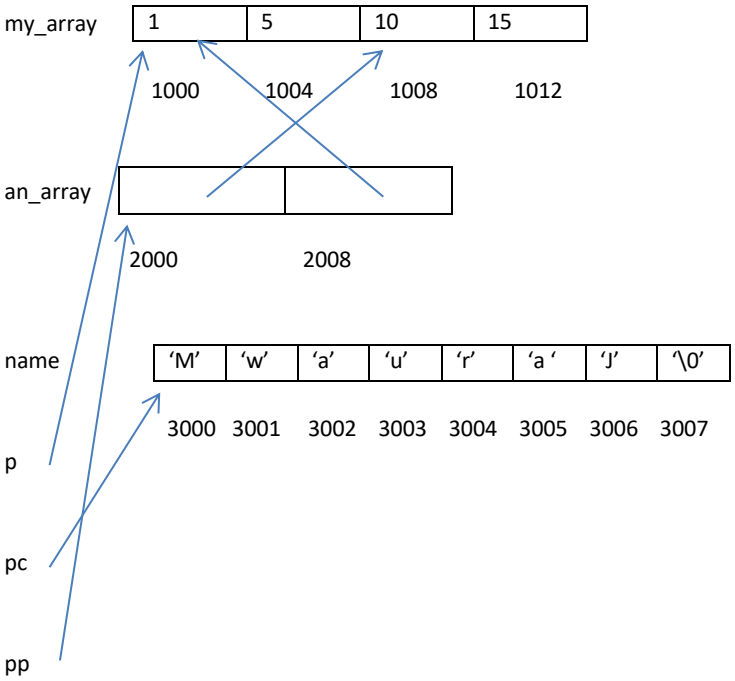
Names: (a)_____, (b)_____, (c)_____, (d)_____

Examine the C code below:

```
#include <stdio.h>
#include <stdlib.h>

/* CS 5008 Lecture 4
 *
 * in-class exercise, pointer fun
 */

/* main
   determine what is printed and draw pictures to show pointers and data
   assume memory address of myArray is 1000
   assume memory address of anArray is 2000
   assume memory address of name is 3000
*/
int main(void) {
  int my_array[] = {1, 5, 10, 15};
  int *an_array[] = { &my_array[2], &my_array[0] };
  char name[] = "MwauraJ";

  int *p = my_array;
  char *pc = name;
  int **pp = &an_array[0];

  (*p)++;
  printf("Value of *p: %d\n", *p);

  p++;
  printf("Value of p: %p\n", p);

  p++;
  *p = 30;
  printf("Value of my_array[2]: %d\n", my_array[2]);

  // draw picture for activity
  printf("DRAW FIRST DATA PICTURE\n\n");

  pp++;
  printf("Value of *pp: %p\n", *pp);
  printf("Value of **pp: %d\n", **pp);

  pp--;
  (*p)++;
```

```
  printf("Values in an_array: %p, %p\n", an_array[0], an_array[1]);
  printf("Deferencing values in an_array: %d, %d\n", *an_array[0], *an_array[1]);

  // draw picture for activity
  printf("DRAW SECOND DATA PICTURE\n\n");

  printf("Value of *pc: %c\n", *pc);

  (*pc)++;
  printf("Value of *pc: %c\n", *pc);

  pc++;
  printf("Value of *pc: %c\n", *pc);

  printf("DRAW THIRD DATA PICTURE\n\n");
  return EXIT_SUCCESS;
}
```

Here is a data picture showcasing the data and pointers just after they are declared. Assume my_array's data is stored starting at memory address 1000. Assume an_array's data is stored starting at memory address 2000. Assume name is stored at memory address 3000.



1. Draw the data picture when the "DRAW FIRST PICTURE HERE" is printed.

2. Draw the data picture when the “DRAW SECOND DATA PICTURE” is printed.

3. Draw the data picture when the “DRAW THIRD DATA PICTURE” is printed.

4. What is printed to the screen when this program runs?

```
Value of *p: ________
Value of p: _______________
Value of my_array[2]: ____
DRAW FIRST DATA PICTURE

Value of *pp: ____________
Value of **pp: ____
Values in an_array: _______, _______
Deferencing values in an_array: _____, _______
DRAW SECOND DATA PICTURE

Value of *pc: _________
Value of *pc: ________
Value of *pc: _________
DRAW THIRD DATA PICTURE
```

The data stored in memory after the initialization of the variables looks like this (assuming my_array starts at memory address 1000, an_array starts at 2000, name starts at 3000, p is at 4000, pc is at 4008, and pp is at 4016).

	Memory Address	Memory Contents
my_array	1000	1
	1004	5
	1008	10
	1012	15
	….	…
an_array	2000	1008
	2008	1000
	…	…
name	3000	'M'
	3001	'w'
	3002	'a'
	3003	'u'
	3004	'r'
	3005	'a '
	3006	'J'
	3007	'\0'
	…	…
p	4000	1000
pc	4008	3000
pp	4016	2000

5. What questions does you team have about pointers and arrays?