Homework 2

1. Ada Scope Rules (2 pts)

```
procedure Main is
  X: Integer
  procedure S1 is
  begin -- of S1
    Put(X);
  end; -- of S1
  procedure S2 is
    X: Integer
  begin -- of S2
    X := 10;
    S1
  end; -- of S2
begin -- of Main
x := 5;
S2
end; -- of Main
```

Assume this Ada program was compiled and executed using **static-scoping rules**. What value of X is printed in procedure S1?

Under **dynamic-scoping rules,** what value of X is printed in procedure S1?

	Static Scoping	Dynamic Scoping
Output:	_____5_____	_____10_____

2. Variables (2 pts)

Suppose a memory address **myaddr** contains the bit pattern: 00000000000000000000000000010110

Describe the value retrieved from **myaddr** when it is accessed by **float *fptr**, and when it is accessed by **int *iptr**.

Value accessed by *fptr - **3.0828566215145975560322050832 4E-44**

Its going to be very small because of its 32 bit representation and the one values are at the end.

Value accessed by *iptr – **22**

$0(2^0) + 1(2^1) + 1(2^2) + 0(2^3) + 1(2^4) = 22$

3. C struct (3 pts)

Given the following declarations:

```
struct Example {
     int data;
     char *tag;
        };
  struct Example *example;
```

Write the code segment needed to set the data variable to 25, and the tag string to "Hello World". First, malloc the storage for an Example struct. The output from this code segment should be: data = 25, tag = Hello World

```
example ex = (example)malloc(sizeof(struct Example));
ex.data = 25;
ex.tag = "Hello World";
printf("data = %i, tag = %s", ex.data, ex.tag);
```

4. Given the following program segment:

```c
void foo(int **, int *, int *);

int main(void) {
    int x=2, y=4;
    int *A=&x, *B=&y, C=2;

    foo(&A, B, &C);
    return(EXIT_SUCCESS);
}
void foo(int **a, int *b, int *c) { ... }
```

The system stack begins at address `0x0248ffe0`

The **addresses** of the variables declared in main are:

```
x:     0x00009012
y:     0x0000900E
A:     0x0000900A
B:     0x00009006
C:     0x00009002
```

Within the body of the function `foo`, give the values for the following expressions: **(5 pts)**

Expression	Write address in the form `0xfeedbeef`
a	0x0000900A
**a	2
*a	0x00009012
&a	0x0248ffdc
*b	4
b	0x0000900E
&b	0x0248ffd8
*c	2
c	0x00009002
&c	0x0248ffd4

5. Python (3 pts)

What does the following function output?

```python
def myfunc(y):
  x = y
  def myinnerfunc():
    print(x*x)
  myinnerfunc()

myfunc(3)
```

Output _____9_____

How do you know if this dynamic-scoping rules or static-scoping rules?

This follows static scoping rules as myinnerfunc uses a static variable x. Even though x is not defined within innerfunc, it still grabs the global value of x and prints 9.