hw9: Linking and Loading Results for VARDAAN KAPOOR (He/him)

Score for this attempt: **7** out of 8
Submitted May 5 at 5:59pm
This attempt took 22 minutes.

Question 1

1 / 1 pts

Consider the following code:

```
int arr[ 8 ];
int* p = arr;
int val = 0;
void main() {
   int x;
   static int y;
   printf("end of main\n");
}
```

The specific memory areas variable `y` and the string `"end of main\n"` will be stored in are .bss and .rodata respectively.

Answer 1:

Correct!

.bss

Answer 2:

Correct!

.rodata

Question 2

1 / 1 pts

```
int func(int val);
int x = 34;

int main(){
  int y;
  y = func(x);
```

```
  return 0;
}
```

The code above is compiled with only the -c flag to create an object file named main.o. In which section of the ELF formatted object file is **the location in the assembly code where func(x) is called** found?

- .rel.data
- .symtab

Correct!

- .rel.text
- .data
- .bss

Question 3

1 / 1 pts

```
#include <stdio.h>

int func(int val);
static int x = 34;
extern int z;

static int doubleIt(int val) {
        return 2*val;
}

int main() {
        int y;
        y = func(x);
        int *a = &y;
        int b = doubleIt(z);
        printf("%d\n", b);
        return 0;
}
```

Select **ALL** the correct statements with respect to the above code?

- References to the variable x in the code above will need relocation during linking.

Correct!

- [x] References to the function func in the code above will need relocation during linking.

- [ ] References to the function doubleIt in the code above will need relocation during linking.

Correct!

- [x] References to the variable z in the code above will need relocation during linking.

Question 4

1 / 1 pts

Given the following main.c

```
int a[2] = {1, 2};
int b[4];
int c = 68;

int main(){
  return 0;
}
```

and the symbol table extracted from main.o

```
Num:    Value  Size Type    Bind   Vis      Ndx Name
  8: 00000000     8 OBJECT  GLOBAL DEFAULT    2 a
  9: 00000004    16 OBJECT  GLOBAL DEFAULT  COM b
 10: X            4 OBJECT  GLOBAL DEFAULT    2 c
 11: 00000000    10 FUNC    GLOBAL DEFAULT    1 main
```

The value of **X** is:

Correct!

8

orrect Answers

8 (with margin: 0)

Question 5

1 / 1 pts

Consider the following code:

```
static int a(void) {
  return 0 + 0;
}

extern int b;
int c = 11;

int main() {
    int d = a();
    return d;
}
```

Select **ALL** the options that will have an entry in the symbol table '.symtab'?

- [ ] d
- [x] a — Correct!
- [x] b — Correct!
- [x] c — Correct!
- [x] main — Correct!

Question 6

1 / 1 pts

Consider the following 3 programs:

1	2	3

`//contents of file foo.c:`
`static int a = 5;`
`int main() {`
`  f();`
`  retur`
	`//contents of file foo.c:`
	`int a = 5;`
	`int main() {`
	`  f();`
	`  retur`
	`n 0;`
	`}`
		`//contents of file foo.c:`
		`static int a = 5;`
		`int main() {`
		`  f();`
		`  return 0;`

```
n 0;
}
//contents o
f file bar.
c:
static int a
= 10;
void f() {
        prin
tf("%d\n",
a);
}
```

```
//contents of
file bar.c:
extern int a;
void f() {
        print
f("%d\n", a);
}
```

```
}
//contents of f
ile bar.c:
int a;
void f() {
        printf
("%d\n", a);
}
```

```
//contents of file bar.c:
int a;
void main() {
        printf("%d\n", a);
}
```

If the command "`gcc foo.c bar.c`" is executed, which of the above programs result in a linker error?

- 1 and 2
- 2 and 3
- 1 only
- 2 only
- 1, 2, and 3
- 3 only

Correct!

Question 7

0 / 1 pts

Consider the following makefile:

```
main: main.o func1.o
        gcc main.o func1.o -o main
main.o: main.c
```

```
        gcc -c main.c
func1.o: func1.h func1.c
        gcc -c func1.c
```

Also consider the following directory listing:

```
-rw-r----- 1 skrentny skrentny   84 Dec  6 09:42 func1.c
-rw-r----- 1 skrentny skrentny   18 Dec  6 09:43 func1.h
-rw-r----- 1 skrentny skrentny 1488 Dec  6 10:11 func1.o
-rwxr-x--- 1 skrentny skrentny 6558 Dec  6 10:16 main*
-rw-r----- 1 skrentny skrentny  130 Dec  6 09:44 main.c
-rw-r----- 1 skrentny skrentny 1608 Dec  6 10:16 main.o
-rw-r----- 1 skrentny skrentny  120 Dec  6 09:40 Makefile
```

Which one lists the commands that are executed as a result of entering `make` on the Linux command line?

Hint: check file dates and determine which rules must execute because any file they depend upon has changed, and in which sequence the rules will execute to build the desired target.

orrect Answer

- `make: `main' is up to date.`

```
gcc -c func1.c
gcc main.o func1.o -o main
```

```
gcc -c main.c
gcc -c func1.c
gcc main.o func1.o -o main
```

ou Answered

- `gcc main.o func1.o -o main`

```
gcc -c main.c
gcc main.o func1.o -o main
```

Question 8

1 / 1 pts

What is the output of the program below when compiled using:

`gcc main.c func.c`

main.c

```
#include <stdio.h>
void func();

static int x = 1;
int y;
static int z = 3;

int main() {
  func();

  printf("%d\n", x + y + z);
  return 0;
}
```

func.c

```
int x = 1;
static int y = 2;
int z = 3;

void func(){
  x = x + y;
  y = 4 + z;
  z = x + y;
}
```

Correct!

- (selected) 4
- 13
- Linker error
- 3
- 20
- 6

Quiz Score: **7** out of 8