

CSCI 51A/E Quiz 4.5

5/4/95

Each question on this test adds some more code to a single assembly language program which contains the following lines of code. Lines containing a sequence of dots indicate that there is some more code in that location which is not shown and is irrelevant. Do not attempt to put any code in place of the dots, they are there as space fillers. The main program follows, and calls subroutine MYSUB which has three arguments, X, Y, and Z. X and Y will be passed on the stack by value, and Z will be passed by reference.

The subroutine must preserve the values in ALL registers, and return with the stack cleaned up, with all arguments removed from the stack. The subroutine will use registers A0, A1, A2, A3, D0, D1, D2, D3, and D4. These registers must be saved and restored by the subroutine. The subroutine will also need to reserve room for 4 longwords on the stack for local variables.

```
X    DC.L    1
```

```
Y    DC.W 2
```

```
Z    DS.W 500
```

```
.....
```

1. Add line(s) of code that push the value of argument X on the stack.
2. Add line(s) of code that push the value of argument Y on the stack.
3. Add line(s) of code that push the address of the array Z on the stack.
4. Add line(s) of code that call subroutine MYSUB

There are some more lines of code in the main program here, and then the subroutine begins:

.....

MYSUB:

5. Add code that reserves room for the 4 longword local variables on the stack. Use the link instruction with A6 for the link register.

6. Add the line(s) of code that save the registers on the stack that are used by the subroutine. Use the MOVEM instruction. How many locations does this add to the stack? \_\_\_\_\_

7. Draw a picture of the stack as exists at this point in the program's execution. (Draw it on the next page, and show the stack location pointed to by the stack pointer SP and by A6.)

8. Add the line(s) of code that move the arguments X into D0 and Y into D1.

9. Add the line(s) of code that move the VALUE of the SECOND member of the array Z into D2. The second member of Z would correspond to Z(1) if subscripts start at zero, as in the C language.

More lines of code follow that accomplish the subroutine's task.

.....  
.....

10. Add the line(s) of code that restore the registers that are used by this subroutine.

11. Add the line(s) of code that reverse the operation of the link instruction and restore A6 to its original value.

12. Add the line(s) of code that remove the arguments from the stack and move the return address to the proper point for returning to the main program.

13. Add the line(s) of code that return to the main program.