

**CS520—Spring 2013—Homework 6**  
**Review for Midterm**

**Question 1** (10 points)

Convert the UTF-16 character (shown in hexadecimal) `0xCAFE` to UTF-8. Show your answer as a sequence of bytes. Show your answer in hexadecimal and show all the hex digits, even if they are zero.

**Question 2** (10 points)

Convert the UTF-32 character (shown in hexadecimal) `0x11111` to UTF-16. Show your answer as a sequence of bytes in Big Endian format. Show your answer in hexadecimal and show all the hex digits, even if they are zero.

**Question 3** (10 points)

Convert the following 32-bit 2's complement integer value (shown in hex) to IEEE floating point.

`FFFFFFF0`

Show your answer in hexadecimal and show all the hex digits, even if they are zero.

**Question 4** (10 points)

Encode the `jmp` instruction in the following vm520 assembly language fragment:

```
top:
    alloc 19
skip:
    jmp top
```

Show your answer in hexadecimal and show all the hex digits, even if they are zero.

**Question 5** (10 points)

Encode the following Java Virtual Machine instruction: `sipush -17`. Show your answer as a sequence of hexadecimal bytes.

**Question 6** (10 points)

Show how the following C string (i.e. null terminated) `"dog"` would be represented using ASCII in the memory of a Big Endian machine with a byte-oriented memory. Show your answer in hexadecimal. Clearly label the order in which the bytes would lay in memory.

**Question 7** (10 points)

Write a C main function that will make a complete copy of the arguments that are passed to a C main function via the `argv` array. Make a copy of the `argv` array as well as the strings pointed to by the `argv` array.

**Question 8** (10 points)

What is the result of adding the following two 32-bit hexadecimal values together as IEEE single-precision floating-point values?

41020240 BE000C00

That is, interpret the two 32-bit values as IEEE single-precision floating point, add them together as a machine implementing the IEEE standard would, and produce the result. Show your answer in hexadecimal.

**Question 9** (10 points)

What is the result of converting the following IEEE double-precision floating-point value to IEEE single-precision floating point?

B800000000000000

That is, interpret this 64-bit value as IEEE double-precision floating point and convert it to IEEE single-precision floating point. Convert it as a machine implementing the IEEE standard would. Show your answer in hexadecimal.

**Question 10** (10 points)

Show the result of linking together the following two object files. Show your result in the same format as the two input files are shown.

The object code for this file should be placed first in the output.

Insymbol Section (1 entries)

f 3

Outsymbol Section (1 entries)

g 1

Object Code (4 words)

0000000	0000200f	call	3
0000001	0000000f	call	[undefined]
0000002	00000000	halt	
0000003	00000010	ret	

The object code for this file should be placed second in the output.

Insymbol Section (1 entries)

g 3

Outsymbol Section (1 entries)

f 0

Object Code (4 words)

0000000	0000000f	call	[undefined]
0000001	0000100f	call	3
0000002	00000000	halt	
0000003	00000010	ret	