

CS 2734, Org II, Fall 2001
First Exam, Selected Answers

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1.  (a) 58 (base 10) = 111010 (base 2)
      -58 (base 10) = ~111010 + 1 = 1111 1111 1100 0101 + 1 =
                                   1111 1111 1100 0110
      (b) 0100 0000 0011 0100 (48 more 0's) (binary) =
          0 10000000011 0100 (48 more 0's) (broken into fields) =

      (-1)^Sign x 2^(Exponent - Bias) x (1 + Significand) =
      (-1)^0 x 2^(1027 - 1023) x (1 + 0.01 (base 2)) =
      1 x 2^4 x 1.25 = 16 x 1.25 = 20.0
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2 and 3.

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# CS 2734, Computer Organization II, Fall 2000
# MIPS program giving answer to Exam1, question 2
    .globl main
main:    addu    $s7, $zero, $ra
##### Start of answer to Question 2 #####
    .data
A:       .word 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
    .text
    la        $s0, A           # address of A
    addi      $t0, $0, 0       # loop counter, start at 0
    addi      $t1, $0, 10      # to terminate loop
    add       $t2, $0, $s0     # address of item in A
    addi      $s1, $0, 0       # running sum
Loop:     lw    $t3, 0($t2)     # store current $t0 into A
    addi      $t0, $t0, 1      # increment loop counter
    addi      $t2, $t2, 4      # increment pointer into A
    add       $s1, $s1, $t3    # add A[i] into running sum
    bne       $t0, $t1, Loop   # branch back to form loop
##### End of answer to Question 2 #####

    ## Print the sum just calculated (129)
    li        $v0, 1
    add       $a0, $s1, $0
    syscall
    jal       Newl

##### Start of answer to Question 3 (first part) #####
    add       $a0, $s0, $0     # addr of A in $a0
    jal       Avals           # call Avals
##### End of answer to Question 3 (first part) #####

    add       $a0, $v0, $0     # print $v0 just returned (5)
    li        $v0, 1
    syscall
    jal       Newl
##### Finish main#####
    addu      $ra, $zero, $s7
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        jr      $ra

##### Start of answer to Question 3 (second part) #####
Avals:                                     #
        addi    $sp, $sp, -4      # room for $ra on stack      #
        sw      $ra, 0($sp)      # save $ra                    #
        lw      $t4, 0($a0)      # $t4 = A[0]                  #
        lw      $t5, 4($a0)      # $t5 = A[1]                  #
        add     $v0, $t4, $t5     # $v0 = A[0] + A[1]           #
        lw      $ra, 0($sp)      # restore $ra from stack      #
        jr      $ra              # return                       #
##### End of answer to Question 3 (second part) #####

##### write newline #####
Newl:   li      $v0, 4
        la      $a0, Newline
        syscall
        jr      $ra
        .data

Blank:  .ascii  " "
##### output #####
# four06% spim -file exam1.s
# 129
# 5
#####
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4.

Addr	Instruction	op	rs	rt	rd	sh	ft
32	0x2008000a	001000	00000	01000	00000	00000	001010
		8	0	8			10
							addi \$t0, \$0, 10
36	0x01284820	000000	01001	01000	01001	00000	100000
		0	9	8	9		32
							add \$t1, \$t1, \$t0
40	0x1509fffe	000101	01000	01001	11111	11111	111110
		5	8	9			-2
							bne \$t0, \$t1, -2

=====

5.

- (a) $D = (A \text{ and } (\text{not } B) \text{ and } (\text{not } C)) \text{ or } ((\text{not } A) \text{ and } (\text{not } B) \text{ and } C)$
or $((\text{not } A) \text{ and } B \text{ and } (\text{not } C))$.
- (b) Standard construction.
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