Name Derick Van Vliet

**EEE174–CpE185 Microprocessors/Microcontrollers**
**ARC1011, 12:00-1:15 pm, Wednesday, October 19, 2011** **F2011 Dahlquist**
**Midterm #1: Open text & notes, (No previous Exams)** **Time allowed: 75min**

1. Given:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | e | l | c | o | m | e | sp | t | o | sp | t | h | e | sp | f |
| 0B0E:0200 | 57 | 65 | 6C | 63 | 6F | 6D | 65 | 20 | 74 | 6F | 20 | 74 | 68 | 65 | 20 | 66 |
| 0B0E:0210 | 69 | 72 | 73 | 74 | 20 | 64 | 61 | 79 | 20 | 6F | 66 | 20 | 74 | 68 | 65 | 20 |
| 0B0E:0220 | 72 | 65 | 73 | 74 | 20 | 6F | 66 | 20 | 79 | 6F | 75 | 72 | 20 | 6C | 69 | 66 |
| 0B0E:0230 | 65 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

An ASCII message begins at memory location 0200, what is the message?

a) Welcome to the first midterm
b) Welcome to the first exam
c) Welcome to the first day of the rest of your life
d) Welcome to Assembly Language
e) Have a great weekend break!

2. The instruction MOV DX, BADD is what addressing mode?

a) Scaled Index
b) Register Indirect
c) Register
d) Immediate
e) Direct

3. Which of the following is the hexadecimal encoding for adding BX with CX and storing the result in CX?

add reg2 to reg1: 0000 00dw 11 reg1 reg2

CX BX

0000 0011 1100 1011

0 3 C B

a) 29DA
b) 03CB
c) 01CB
d) 01DA
e) 01D8
f) 03D9

4. What is the advantage of Assembly Language over C Language?

a) The Assembler creates much faster executable code
b) Hand assembly coding is much faster in C
c) C is transportable to other microprocessor architectures
d) C does not need a compiler to be assembled in to an executable program.
e) All the above

5. What is $18.4375_{10}$ in binary?

16 2 .25 .125 .0625

10010.0111 0

.25
+.125
+.0625
.4375

a) 001110.01110
b) 001111.01010
c) 010010.01101
d) 010010.01110
e) 100010.01110

6. For the instruction sequence below, determine the contents of the register AL after this program is executed:

B

a) 151H
b) 51H
c) -51H
d) EBH
e) F1H

| Program Listing |
|---|
| MOV AL, 75h |
| ADD AL, 76h |
| DAA |

decimal adjust al after addition

7. In x86 architecture, ALU stands for which of the following?

a) A Logic User
b) Address Logic Unit
c) All Logic Unit
d) Arithmetic Lining Unit
e) Arithmetic Logic Unit

55/42 83%

8. A microprocessor with a 33-bit address bus could access how much memory?
   a) 2 GB
   b) 2 MB
   c) 8 MB
   d) 64 MB
   e) 8 GB
   f) 128 MB

$2^3$ $2^{30}$
8 GB

9. What is the hexadecimal encoding for "JGE" for a jump back 12 bytes?
   a) 7DFA
   b) 7DF2
   c) 7DF4
   d) 7D0C
   e) 7D12
   f) 7DEE

have to jump instruction plus 12 bytes
12 distance
2 instruction
14
jumping back so -14
0000 1110
1111 0001
1
1111 0010

10. Given:

```
AX=FFE0  BX=3534  CX=0000  DX=0180  SP=FFEE  BP=0000  SI=0000  DI=0000
DS=1D72  ES=1D72  SS=1D72  CS=1D72  IP=010F   NV UP EI NG NZ NA PO NC
1D72:010F 7D18          JGE     0128
```

How many bytes in decimal will the processor jump if the conditions for a jump are met?
   a) 10F
   b) 10D
   c) 18
   d) 24
   e) 115

010F
↓
0128

010F 0113 0117 011B 011F 0123 0127
0110 0114 0118 011C 0120 0124 0128
0111 0115 0119 011D 0121 0125
0112 0116 011A 011E 0122 0126

11. Moore's law has accurately predicted the growth rate in the number of transistors per die for the last 40 years. What is that rate?
   a) Doubling every 18 - 24 hours
   b) Doubling every 18 - 24 months
   c) Doubling every 18 - 24 weeks
   d) Doubling every 18 - 24 years
   e) Doubling every 36 - 48 months

12. The number of bytes in a word are:
   a) 32
   b) 16
   c) 8
   d) 4
   e) 2

13. Determine the contents of register BL after the following instructions have been executed:

| Program Listing |
|---|
| MOV BL, E2H |
| MOV CL, 0100b |
| ROL BL, CL |

   a) E2H
   b) 4H
   c) 2EH
   d) 4EH
   e) 2H

1110 0010
rotate left 4x

14. How many bit(s) is/are required to represent a range of decimal numbers from 0 to 127?
   a) 1
   b) 2
   c) 4
   d) 7
   e) 8

8 7 6 5 4 3 2 1
128 64 32 16 8 4 2 1

15. What high level language is the propeller programmed in?
    a) Assembly
    b) C
    c) C++
    d) Java
    e) Spin
    f) All of the above

16. In the Propeller microcontroller, the command "dira[4..9] := %000000" would cause the processor to do which of the following?
    a) Set the A port to an input port
    b) Sets the Propeller pins P4 through P9 as input pins
    c) Sets the Propeller pins P4 through P9 as output pins
    d) Sets the register bits in dira low
    e) All the above

17. Which command would you use to execute another core in the propeller microcontroller?
    a) PUB
    b) Cognew
    c) Method
    d) VAR
    e) EXE Core

18. How many cores does the propeller microcontroller have?
    a) 2
    b) 4
    c) 8
    d) 16
    e) 32

19. In the Propeller microcontroller, the command "waitcnt(clkfreq*10 + cnt)" would cause the processor to do which of the following?
    a) to slow down 10 times
    b) to speed up 10 times
    c) Set the processor speed to 10 MHz
    d) Create 10 microsecond delay
    e) Create 10 millisecond delay
    f) Create 10 second delay

20. The acronym ADC in microcontrollers stands for which of the following?
    a) A Digital Channel
    b) All Digital Connection
    c) All Download Complete
    d) Analog to Digital Converter
    e) Analog and Digital Converter
    f) Analog from Digital Conversion

21. The acronym PWM used in the Parallax Propeller and MicroChip PIC18, is defined as:
    a) Parallel Width Manipulation
    b) Parallel Wide Manipulator
    c) Pulse Width Modulation
    d) Poor Wonderer Manipulator
    e) Parallel Width Modulator

22. How many bits does the PIC18 microcontroller used in the PICkit 3 Debug Express have?
    a) 8
    b) 16
    c) 18
    d) 24
    e) 32

A

23. Which of the following would be used to set the TRISA register to control the direction of the PIC18 Port to input?
    a) =output
    b) =/input
    c) 0
    d) DIRA := 0
    e) 1

E

24. In the PIC18 with TRISD = 0b01111111, what is the configuration of the Port D?
    a) Bit 7 of port D is set to input
    b) Bit 7 of port D is set to output
    c) Port D is set as an input port
    d) Port D is set as an output port
    e) Port D is set to 127 decimal

B

25. In the PIC18 with TRISD = 0b11110000 and LATD = 0xAA, what value will be on Port D and shown on the LEDs?
    a) F0
    b) AA
    c) A0
    d) 0F
    e) 0A

E

26. On the Arduino platform, what is the programming language used?
    a) x86 assembly
    b) Spin
    c) Arduino basic
    d) C
    e) C++
    f) Java

27. Given:

```
AX=FFD0  BX=3534  CX=0000  DX=0180  SP=FFEE  BP=0000  SI=0000  DI=0000
DS=1D72  ES=1D72  SS=1D72  CS=1D72  IP=0111   NV UP EI NG NZ NA PO CY
1D72:0111 EB08          JMP     0119
```

What will the IP value be after a "t" command is executed in DOS Debug?
    a) 8 bytes forward
    b) 0119h
    c) 0113h
    d) 0111h
    e) 0008d

JMP jumps unconditionally

28. How many bytes are there in this short sequence of code? B400CD164CCD21CD20
    a) 3
    b) 6
    c) 7
    d) 9
    e) 14
    f) 18

1 2 3 4 5 6 7 8 9

29. In x86 architecture, BIU stands for which of the following?
    a) Best Integrated Unit
    b) Best Interface Unit
    c) Best Interface User
    d) Bus Integrated Unit
    e) Bus Interface Unit

30. Here is a short sequence of code: **7413EBA3CD167D213C04EBF0EB15**. All of the instructions are a word long. The fifth instruction operator is:
    a) CMP
    b) INT
    c) JGE
    d) JMP
    e) JNZ

31. The ASCII codes for space, space, carriage return, line feed, end of string in decimal are:
    a) 0D, 30, 20, 20, 24
    b) 20, 20, D0, A0 24
    c) 20, 20, 0D, 0A 24
    d) 32, 32, 13, 10, 36
    e) SP, SP, CR, LF, $

32. A "NOP" instruction in a program will:
    a) Set a Normal Operating Point
    b) Clear the Overflow flag
    c) Perform a No Operation
    d) Reset the IP register
    e) Exit the program

33. Given:

```
AX=FFF0  BX=3534  CX=0000  DX=0180  SP=FFEE  BP=0000  SI=0000  DI=0000
DS=1D72  ES=1D72  SS=1D72  CS=1D72  IP=0109   OV UP EI PL NZ NA PO CY
1D72:0109 7D06          JNL     0118
```

What is the signed decimal value of the number in the AX register?
    a) 16
    b) 30
    c) 10
    d) -16
    e) -10

34. Which of the following DOS Debug instructions would set a break point at memory location 010C?
    a) B 0C10
    b) B = 100 10C
    c) G = 100 10C
    d) G = 010C
    e) G [010C]

35. In adding 5+7 through a 4 bit integer unit, the state of the OF and CF flags after the add instruction would be:
    a) OF = 0, CF = 0
    b) OF = 0, CF = 1
    c) OF = 1, CF = 0
    d) OF = 1, CF = 1
    e) OF = 0, CF = 0, ZF = 0

overflow flag looks at signed operations

no overflow

no carry

36. Given:

```
AX=FFD0  BX=3534  CX=0000  DX=0180  SP=FFEE  BP=0000  SI=0000  DI=0000
DS=1D72  ES=1D72  SS=1D72  CS=1D72  IP=010D   OV UP EI NG ZR NA PO NC
1D72:010D 7509          JNZ     0116
```

What will the IP value be after a "t" command is executed in DOS Debug?

a) 0009h
b) 010Dh
c) 010Eh
d) 010Fh
e) 0116h

jump if not zero
but it is zero, so no jump

37. What are the contents of DX after this program has been run:

E

a) 0010h
b) -0010h
c) 5511h
d) D800h
e) FFF0h

```
MOV DX, 11h
MOV CX, [5512]
MOV BX, 5511h
SUB DX, [BX]
AND BX, FFFF
```

| Memory location | Contents |
|---|---|
| 5514 | 24 |
| 5513 | D8 |
| 5512 | 00 |
| 5511 | 21 |
| 5510 | 00 |

38. Which of the following DOS Debug instructions would be used to change the IP register to 010C?

a) G=IP 010C
b) RAX = 010C
c) RBX = 100 10C
d) RIP
e) RIP = [010C]

39. What is the number, $1010.0101_2$ in decimal?

a) 10.31
b) A.5
c) -A.5
d) -10.31
e) FFB4

40. What command in DEBUG would be used to step through a program line by line?

a) RIP
b) RCS
c) T
d) R
e) P

41. AND'ing 1FH and 02H will result in which of the following?

a) 0
b) 02
c) 16
d) 3F
e) 63

42. How many address lines would be required to address 64 MB directly?

a) 512
b) 64
c) 26
d) 24
e) 20

$2^6 \quad 2^{20} = 2^{26}$ 26 lines

64 MB

EE174–CpE185 Microprocessors/Computer App Name Derick Van Vliet
ARC 1011, 12:00 - 1:15 pm, Wednesday, November 16, 2011 F2011 Dahlquist
Midterm #2: Open text & notes, (No sample or previous Exams) Time allowed: 75min

1. Given the short code, what is the value in AX after the program is run?

| Program Listing |
|---|
| Mov BX, 0500 |
| Push BX |
| Mov AX, 0100 |
| POP AX |

a) 0500
b) 0100
c) 0005
d) 0001
e) 0000

2. A "pull down" resistor is used in digital circuits to do what?
a) To keep the signal "tied" high until the line is active (goes low)
b) To keep the signal line "tied" low until the line is active (goes high)
c) To keep the voltage at 0Volts
d) To keep the voltage at 1Volt
e) To make sure the digital line is always high

3. A "POP" instruction:
a) decrements the SP
b) increments the IP
c) increments the SP
d) points to the data inputted from the keyboard
e) stores the returning address

4. Ladder Logic is used in?
a) Power Logic Controllers
b) PLCs
c) ALUs
d) BIUs
e) CPUs

5. If CX is 0001, what will CX be after a "LOOPNZ" instruction?
a) 0000
b) 0001
c) 0002
d) 0003
e) FFFF

6. If the SP is F00F, what is the SP value after a "POP CX" instruction?
a) F010
b) F00D
c) F011
d) F00C
e) F012

7. The acronym PWM used for motor control, is defined as which of the following?
a) Poor Wonderer Manipulator
b) Pulse Width Modulation
c) Parallel Width Modulator
d) Parallel Width Manipulation
e) Parallel Wide Manipulator

8. How many bit(s) is/are required to represent a range of decimal numbers from 0 to 9?
   a) 1
   b) 2
   c) 4
   d) 7
   e) 8

9. In the PIC18 with TRISD = 0b01000000, what is the configuration of the Port D?
   a) Bit 7 of port D is set to input
   b) Bit 7 of port D is set to output
   c) Port D is set as an input port
   d) Port D is set as an output port
   e) Port D is set to 127 decimal

10. Which of the following is not a valid command for a number into a register in MASM?
    a) MOV CL, 220
    b) MOV BL, 01010010B
    c) MOV AX, 0BEEFH
    d) MOV AX, BADH
    e) MOV AH, 0BCH

11. You are trying to rebuild a HELLO project program in MASM and you get the following error: "LINK : warning L4021: no stack segment".
    What would be the reason for such an error?
    a) MASM isn't installed correctly on the computer being used
    b) No " .mak " file specified
    c) No project template for COM was selected
    d) No source file is identified (no .asm file)
    e) No project was setup

12. What flag(s) does the "LOOPNE" instruction look at to determine whether to loop or not?
    a) CX
    b) SF and ZF
    c) SF and OF
    d) OF and CF
    e) ZF

13. In the Propeller microcontroller, the command "dira[4..9] := %000000" would cause the processor to do which of the following?
    a) Set the A port to an input port
    b) Sets the register bits in dira low
    c) Sets the Propeller pins P4 through P9 as output pins
    d) Sets the Propeller pins P4 through P9 as input pins
    e) All the above

14. What command in MASM-CodeView would be used to step through a program line by line?
    a) RIP
    b) RCS
    c) T (F8)
    d) R
    e) P (F10)

15. What is the binary value of decimal 12.875?
    a) 1011.1110
    b) 1100.11001
    c) 1100.1110
    d) 1101.0101
    e) 11000.1110

$12_{10} = 1100_2$

$2^{-1} = \frac{1}{2}$ $\quad 2^{-2} = \frac{1}{4}$ $\quad 2^{-3} = \frac{1}{8}$ =

.875 =

$\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$

= .111

16. What is the numeric sequence of the key pad columns on the PPE board?
    a) 2,4,6,8
    b) 1,2,4,8,
    c) 37,2F,1F
    d) 1,2.3.4
    e) 378,379
    f) 08, 10, 20

17. In MASM, with a "MOV CX, 18h" instruction, and a "LOOP" instruction, in decimal how many times will the program loop?
    a) 0C
    b) 24
    c) 18
    d) 12
    e) 36

18. A "PUSH" instruction:
    a) increments the SP
    b) increments the IP
    c) decrements the SP
    d) points to the data inputted from the keyboard
    e) stores the returning address

19. In the Hello MASM lab in the original code, what is the address of the byte used to start the number in the sequence "Hello World 0"?
    a) 0200
    b) 020E
    c) 0100
    d) message
    e) Hello

20. In the Propeller microcontroller, the command "waitcnt(clkfreq*5 + cnt)" would cause the processor to do which of the following?
    a) A 5 second delay
    b) A 5 millisecond delay
    c) Set the processor speed to 5 MHz
    d) Causes the processor to speed up 5 times
    e) Causes the processor to slow down 5 times

21. ADD'ing 10H and 2FH will result in which of the following?
    a) 0
    b) 3F
    c) 16
    d) 45
    e) 63

adding the quantities

$$\begin{array}{r} 2F \\ 10 \\ \hline 3F \end{array}$$

22. A "pull up" resistor is used in digital circuits to do what?
    a) To make sure the digital line is always high
    b) To keep the voltage at 1Volt
    c) To keep the voltage at 0Volts
    d) To keep the signal line "tied" low until the line is active (goes high)
    e) To keep the signal "tied" high until the line is active (goes low)

23. With a POPA instruction, what will be the order of the accumulator, base, count, and data registers restored from the stack?
    a) ABCD
    b) DBAC
    c) BDCA
    d) ACDB
    e) BX

24. In the Propeller microcontroller, the term "Method" is(are) which of the following?
    a) Variables given to objects, they can be available to other objects or variable used within an object.
    b) An application building block comprised of all the code.
    c) A processor inside the propeller chip, the propeller has 8 methods per chip.
    d) A block of executable commands that has variables, can receive parameters, and returns a value.
    e) All the above

25. If the SP is F00F, what is the SP value after a "PUSH DX" instruction?
    a) F010
    b) F00D
    c) F011
    d) F00C
    e) F012

26. The "LOOPNZ" instruction is equivalent to which of the following instructions?
    a) DEC CX, JNE
    b) DEC CX, JGE
    c) INC CX, JNZ
    d) JNZ, DEC CX
    e) JZ, INC CX

27. What type of program is this?

```
AX=0000  BX=0000  CX=0000  DX=0000  SP=FFEE  BP=0000  SI=0000  DI=0000
DS=1376  ES=1376  SS=1376  CS=1376  IP=0115   NV UP EI PL NZ NA PO NC
1376:0115 0100          ADD     [BX+SI],AL                    DS:0000=CD
```

    a) MASM
    b) Debug
    c) ADD
    d) EXE
    e) COM

28. What Hex values must be sent to address the key pad rows on the PPE board?
    a) 1,2.3.4
    b) 1,2,4,8,
    c) 2,4,6,8
    d) 37,2F,1F
    e) 378,379
    f) 08, 10, 20

34 = 32 + 2

29. What is -34 decimal in 2's complement (8 bits)?
    a) 1110 0111
    b) 0010 0010
    c) 1011 0100
    d) 0001 1001
    e) 1101 1110

0010 0010
1101 1101
+ 1
1101 1110

30. Given:

```
13A7:0110  CD 20 30 20 54 68 69 73-20 69 73 20 74 68 65 20
13A7:0120  66 69 72 73 74 20 4D 69-64 74 65 72 6D 0D 24 D9
13A7:0130  00 C6 00 00 00 00 00 00-00 00 00 00 00 00 00 00
```

An input buffer is at memory location 0113, how many bytes are in the buffer (in decimal)?
    a) 20
    b) 25
    c) 30
    d) 32
    e) 48

31. How much global RAM does the Propeller microcontroller have?
    a) 8MG
    b) 4KB
    c) 32KB
    d) 2GB
    e) 16KB

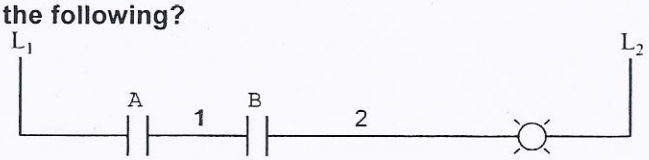
2KB per cog
8 cogs

32. In the Propeller, how many values does a method return?
    a) 1
    b) 2
    c) 4
    d) 8
    e) As many values as there are objects in the method

33. AND'ing 10H and 2FH will result in which of the following?
    a) 0
    b) 3F
    c) 16
    d) 45
    e) 63

34. In the Propeller microcontroller, the command "dira[4..9] := %000000" would cause the processor to do which of the following?
    a) Set the A port to an input port
    b) Sets the register bits in dira low
    c) Sets the Propeller pins P4 through P9 as output pins
    d) Sets the Propeller pins P4 through P9 as input pins
    e) All the above

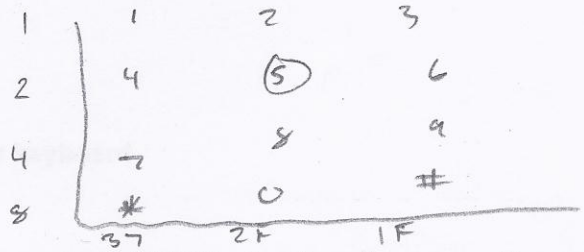
35. The Ladder Logic diagram would represent which of the following?
    a) XOR
    b) OR
    c) NAND
    d) AND
    e) OPEN CIRCUIT



36. Which of the following is a valid x86 command for multiplying a number?
    a) MUL BX
    b) MUL CL,BL
    c) MUL BX, 0C40FH
    d) MUL AX, BADH
    e) MUL 10H

37. The instruction MOV CX, [SI] is what addressing mode?
    a) Direct
    b) Scaled Index
    c) Register Indirect
    d) Immediate
    e) Register

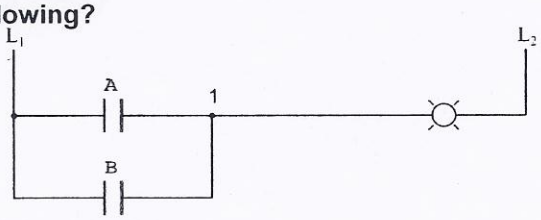
38. On the PPE board, what number(s) on the key pad is(are) pressed for an output port value of 02h and an input port value of 2Fh?
    a) 0
    b) 8
    c) 378,379
    d) 2
    e) 5
    f) 37, 2F, 1F
    g) 1,2,4,8,




39. In MASM, with a "MOV CX, 24" instruction, and a "LOOP" instruction, how many times will the program loop in decimal?
    a) 0C
    b) 24
    c) 18
    d) 12
    e) 36

40. The letters "NC" labeled on relays and PLCs means which of the following?
    a) Normal Code
    b) No Code
    c) Normally Closed
    d) Not a Computer
    e) Not Closed

41. The Ladder Logic diagram would represent which of the following?
    a) XOR
    b) OR
    c) NAND
    d) AND
    e) OPEN CIRCUIT




42. If you want to use a INT software interrupt function to print a string out to the screen, what is the function code, start pointer, termination character, and interrupt you need to use?
    a) ah = 09h, ds:dx, "$", 21h
    b) ah = 10h, ds:dx, "$", 21h
    c) ah = 09h, es:dx, ":", 10h
    d) ah = 0eh, es:dx, ":", 10h
    e) ah = 0eh, ds:dx, "$", 10h