

1. What is the bitwise AND of 0x7A with 0xDE?

0x11

0x5A

0xEB

0xF0

2. What is the bitwise OR of 0x05 with 0x9A?

0x1F

0x95

0x55

0x9F

3. What is the bitwise XOR of 0xC9 with 0x23?

0xEA

0xE0

0xC3

0x9C

4. What is the value of  $\sim (0x3F)$ ?

0x88

0xF0

0xC0

0x01

5. What is the value of  $(0x0F) \& (0xF0)$ ? 0x11

0xFF

0x05

0x00

6. What is the value of  $(0x77) \mid (0x88)$ ?

0xE2

0xFF

0xB1

0x0F

7. What is the value of  $(0xE2) \wedge (0x46)$ ?

0xA4

0xDD

0x25

0x4E

8.  $PORTA = 0x7C$ . The following line of code produces what result?

`PORTA &= ~(1 << PORTA2);`

0x11

0x5A

0x78

0xC8

9. Which line of code sets the 6th and 7th bits of  $PORTB$  to 1 without changing any other bits?

`PORTB = (1 << PORTB7) | (1 << PORTB0);`

`PORTB |= (1 << PORTB7);`

`PORTB |= (1 << PORTB6);`

`PORTB |= (1 << PORTB6) | (1 << PORTB7);`

10. Which SFR selects the direction for whether a pin will be configured as an input or an output?

PORT

DDR

PIN

11. Which SFR is used to drive the pin when it is configured as an output?

PIN

DDR

PORT

12. Which SFR is used to read the actual logic value on a pin? PIN

PORT

DDR

13. To enable the internal pull-up resistor the correct procedure is:

Set PINxn to 1, then DDxn to 1.

Set DDxn to 1, then PORTxn to 0.

Set PORTxn to 1, then DDxn to 1.

Set DDxn to 0, then PORTxn to 1.

14. What do the following 2 lines of code do?

```
DDRB |= ( 1 << DDB6);
```

```
PORTB |= ( 1 << PORTB6);
```

Configures pin #12 on Arduino Board for an output, output is logic high;

Configures pin # 51 on Arduino Board for an output, output is logic high;

Configures pin #12 on Arduino Board for an input, internal pullup resistor is enabled;

15. Which of the following are components of a typical timer circuit?

Output Compare Register

Prescaler

Clock

Counting Register

Push Button Switch

16. What options are there for matching an ATMEGA2560 timing system to the desired timing for the specific application?

Change the prescaler value

Use an external clock source

Use 16 bit versus 8 bit timing system

Change the PORT location

17. For a 16 Mhz clock, an 8 bit compare value of 100 and a prescaler of 1024 - What is the timer resolution?

64 microseconds

100 milliseconds

1 microsecond

0.1 milliseconds

18. For a 16 Mhz clock, an 8 bit compare value of 100 and a prescaler of 1024 - What is the time duration?

5 microseconds

1200 milliseconds

6.4 milliseconds

100 microseconds

19. If we want a 20 microsecond timer using a pre-scaler of 8 and a clock of 16 MHz, what value must go in OCR0A?

250

40

20

5

20. When using an interrupt service routine (ISR), the program main() is halted until the ISR has completed execution

TRUE

FALSE

21. Variables used in ISR routines should be declared as volatile during global variable definitions.

TRUE

FALSE

22. The group of memory locations set aside to hold the addresses of ISRs are listed in the

Interrupt Vector Table

General Purpose Register Table

Port Pin Configuration Table

23. When configuring a Pin Change Interrupt, what two registers must be set up for your device

Pin Change Interrupt Control (PCICR) and Pin Change Mask (PCMSKn) registers

Pin Change Interrupt Control (PCICR) and the PORTn Data registers

Pin Change Mask (PCMSKn) and the Timer/Counter registers

24. Write the line of code to properly configure the Pin Change Mask Register for a Pin Change Interrupt for of pin #15 on the Arduino board. Use one of the Pin Change Mask Registers below.

### 15.2.7 PCMSK2 – Pin Change Mask Register 2

Bit	7	6	5	4	3	2	1	0	
(0x6D)	PCINT23	PCINT22	PCINT21	PCINT20	PCINT19	PCINT18	PCINT17	PCINT16	PCMSK2
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

- **Bit 7:0 – PCINT23:16: Pin Change Enable Mask 23:16**

Each PCINT23:16-bit selects whether pin change interrupt is enabled on the corresponding I/O pin. If PCINT23:16 is set and the PCIE2 bit in PCICR is set, pin change interrupt is enabled on the corresponding I/O pin. If PCINT23:16 is cleared, pin change interrupt on the corresponding I/O pin is disabled.

### 15.2.8 PCMSK1 – Pin Change Mask Register 1

Bit	7	6	5	4	3	2	1	0	
(0x6C)	PCINT15	PCINT14	PCINT13	PCINT12	PCINT11	PCINT10	PCINT9	PCINT8	PCMSK1
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

- **Bit 7:0 – PCINT15:8: Pin Change Enable Mask 15:8**

Each PCINT15:8-bit selects whether pin change interrupt is enabled on the corresponding I/O pin. If PCINT15:8 is set and the PCIE1 bit in PCICR is set, pin change interrupt is enabled on the corresponding I/O pin. If PCINT15:8 is cleared, pin change interrupt on the corresponding I/O pin is disabled.

### 15.2.9 PCMSK0 – Pin Change Mask Register 0

Bit	7	6	5	4	3	2	1	0	
(0x6B)	PCINT7	PCINT6	PCINT5	PCINT4	PCINT3	PCINT2	PCINT1	PCINT0	PCMSK0
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

- **Bit 7:0 – PCINT7:0: Pin Change Enable Mask 7:0**

Each PCINT7:0 bit selects whether pin change interrupt is enabled on the corresponding I/O pin. If PCINT7:0 is set and the PCIE0 bit in PCICR is set, pin change interrupt is enabled on the corresponding I/O pin. If PCINT7:0 is cleared, pin change interrupt on the corresponding I/O pin is disabled.



# THE UNOFFICIAL ARDUINO MEGA PINOUT DIAGRAM

ECE Practice Exam b

**LEGEND**

- GND
- POWER
- CONTROL
- PHYSICAL PIN
- PORT PIN
- ATMEGA PIN FUNC
- DIGITAL PIN
- ANALOG-RELATED PIN
- PWM PIN
- SERIAL PIN

**General Information**

- Pay Attention
- No Really PAY ATTENTION
- LED

