30/30 Questions Answered

Saved at 7:03 PM

HW2-Number Systems and Digital IO

Q1
6 Points

Data Representation

Perform the following number system conversions. Note: It may be easier to convert them to the desired base in a different order than shown here. (2 pts. per conversion)

$$1100101.1011_2 =$$

Q1.1
2 Points

$$?_8 =$$

Just type the digits (without any preceding or trailing spaces or characters)

145.54

✔ Correct

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Q1.2
2 Points

$?_{16}$

Just type the digits (without any preceding or trailing spaces or characters)

65.B

✔ **Correct**

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Q1.3
2 Points

$?_{10}$

Just type the digits (without any preceding or trailing spaces or characters)

101.6875

✔ **Correct**

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Q2
6 Points

$$1A9.D_{16} =$$

Q2.1
2 Points

$?_8 =$

Just type the digits (without any preceding or trailing spaces or characters)

651.64

✔ **Correct**

| Save Answer | Last saved on **Sep 19 at 6:55 PM** |

Q2.2
2 Points

$?_2 =$

Just type the digits (without any preceding or trailing spaces or characters)

110101001.1101

✔ **Correct**

| Save Answer | Last saved on **Sep 19 at 6:55 PM** |

Q2.3

2 Points

$?_{10} =$

Just type the digits (without any preceding or trailing spaces or characters)

425.8125

✔ Correct

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Q3
6 Points

$617_8 =$

Q3.1
2 Points

$?_{16} =$

Just type the digits (without any preceding or trailing spaces or characters)

18F

✔ **Correct**

| Save Answer | Last saved on **Sep 19 at 6:58 PM** |

Q3.2
2 Points

$?_2 =$

Just type the digits (without any preceding or trailing spaces or characters)

110001111

✔ **Correct**

| Save Answer | Last saved on **Sep 19 at 6:58 PM** |

Q3.3

2 Points

$?_{10} =$

Just type the digits (without any preceding or trailing spaces or characters)

399

✔ Correct

Save Answer　　Last saved on **Sep 19 at 6:58 PM**

Q4
8 Points

Convert the powers of 2 shown below to its approximate decimal value using K to represent 10^3, M for 10^6, G for 10^9, and T for 10^{12}. (e.g. $2^{12} \approx 4K$)

Q4.1
2 Points

2^{19} = ?

　　9K

　　256M

　　256K

　　512K

　　512M

✔ **Correct**

Save Answer　　Last saved on **Sep 19 at 6:58 PM**

Q4.2
2 Points

2^{43} = ?

    16T

    8T

    16M

    8G

    16G

    ✔ **Correct**

    Save Answer   Last saved on **Sep 19 at 6:58 PM**

Q4.3
2 Points

2^{36} = ?

    8G

    64G

    8T

    8M

    64M

    ✔ **Correct**

    Save Answer   Last saved on **Sep 19 at 7:00 PM**

Q4.4
2 Points

2^{24} = ?

8M

4M

16M

16G

4K

✔ **Correct**

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Q5
3 Points

To force some bits to `0` while leaving other bits in a
register unaffected we should use
the bitwise `AND` operation

True

False

✔ **Correct**

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Q6
6 Points

Match the following operations to their descriptions

Set bit 4 of PORTD	PORTD &= ~(0x04);
Set bit 2 of PORTD	PORTD |= 0x10;
Clear bit 4 of PORTD	PORTD &= ~(0x10);
Clear bit 2 of PORTD	PORTD |= 0x04;

Q6.1
1.5 Points

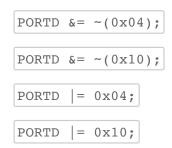## Which of the following operations matches the description:

Set bit 4 of `PORTD`

`PORTD |= 0x10;`

`PORTD |= 0x04;`

`PORTD &= ~(0x10);`

`PORTD &= ~(0x04);`

✔ **Correct**

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Q6.2
1.5 Points

Which of the following operations matches the description:

Set bit 2 of `PORTD`

`PORTD &= ~(0x04);`

`PORTD &= ~(0x10);`

`PORTD |= 0x04;`

`PORTD |= 0x10;`

✔ **Correct**

Save Answer   Last saved on **Sep 19 at 7:01 PM**

Q6.3
1.5 Points

Which of the following operations matches the description:

Clear bit 4 of `PORTD`

`PORTD &= ~(0x10);`

`PORTD |= 0x10;`

`PORTD &= ~(0x04);`

`PORTD |= 0x04;`

✔ **Correct**

Save Answer   Last saved on **Sep 19 at 7:01 PM**

Q6.4
1.5 Points

Which of the following operations matches the description:

Clear bit 2 of `PORTD`

`PORTD |= 0x10;`

`PORTD &= ~(0x04);`

`PORTD &= ~(0x10);`

`PORTD |= 0x04;`

✔ **Correct**

Save Answer   Last saved on **Sep 19 at 7:01 PM**

Q7

6 Points

Taking an 8-bit value such as `PORTD` and `AND`ing it with the value `0x20` as in: `PORTD & 0x20` can result in which possible outcomes/values (select all that apply)

- ☐ `0x20`

- ☐ `0x00`

- ☐ `0xff`

- ☐ `0xdf`

✔ Correct

| Save Answer | Last saved on **Sep 19 at 7:01 PM** |

Q8
9 Points

Match the register with the correct description of its use

PORTx (Port Output Register)	Grabs (samples) the voltage value currently present on a pin being used as input
DDRx (Data Direction Register)	Determines the value of a pin as output OR enables the internal pull-up resistor on a pin used as input
PINx (Port Input Register)	Determines whether a pin is used as input or output

Q8.1
3 Points

Which of the following registers match the description?

PORTx (Port Output Register)

- Determines whether a pin is used as input or output

- Grabs (samples) the voltage value currently present on a pin being used as input

- Determines the value of a pin as output OR enables the internal pull-up resistor on a pin used as input

✔ **Correct**

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Q8.2
3 Points

Which of the following registers match the description?

DDRx (Data Direction Register)

> Determines whether a pin is used as input or output

> Grabs (samples) the voltage value currently present on a pin being used as input

> Determines the value of a pin as output OR enables the internal pull-up resistor on a pin used as input

✔ **Correct**

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Q8.3
3 Points

Which of the following registers match the description?

PINx (Port Input Register)

Determines whether a pin is used as input or output

Grabs (samples) the voltage value currently present on a pin being used as input

Determines the value of a pin as output OR enables the internal pull-up resistor on a pin used as input

✔ Correct

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Q9

6 Points

Poor Billy Bruin connected pushbuttons to port `B1` and `B0` of his Arduino. He wants to turn on an LED on port `D7` if someone pushes both buttons at the same time (assume he uses the typical button wiring used in lecture and lab). He writes the code below but when he runs it, it does NOT work. What is a likely problem?

```
DDRD |= (1<<PD7);
while( 1 ) {
 if( (PINB & 0x03) == 0x00 ){
 // turn on the LED
 PORTD |= 0x80;
 }
}
```

He needed to grab the values on PINB and isolate bits 1 and 0 by saving it to a variable first then examining the variable in an 'if' statement as in:

`char status = PINB & 0x03; if (status == 0x00 ){ … }`

He didn't set the PORTB bits to inputs as in: `DDRB = 0x00;`

He didn't enable the pull-up resistors for port B1 and B0 by doing the following initialization:

`DDRB &= ~0x03; PORTB |= 0x03;`

He could have just checked whether both PORTB bits 1 and 0 were both 1 by changing the if statement to read:

`if( PINB == 0x00 ){ … }`
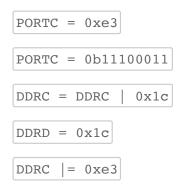
✔ **Correct**

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Q10
6 Points

Which statement below initializes `PORTC` to use bits 7-5 and 1-0 as outputs?

`PORTC = 0xe3`

`PORTC = 0b11100011`

`DDRC = DDRC | 0x1c`

`DDRD = 0x1c`

`DDRC |= 0xe3`

✔ Correct

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Q11
6 Points

Billy Bruin wants to clear bit 3 of `PORTD` but isn't sure how. Select the correct method for poor Billy.

`PORTD &= 0x03`

`PORTD &= 0x08`

`PORTD &= ~(1 << PD3)`

`PORTD |= 0b00001000`

✔ Correct

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Q12
6 Points

Assume we have a pushbutton connected to port D5 of our Arduino and it requires the pull-up resistor to be enabled. How would we do that and then check whether the input voltage on pin D5 is actually a 1

Option A

```
DDRD = (1 << PD5);
if( PIND & (1 << PD5 ){
    // executes if the volatge on pin D5
    is high = logic 1
}
```

Option B

```
DDRD = 0x00;
PORTD |= (1 << PD5);
if( PIND & (1 << PD5 ){
 // executes if the volatge on pin D5 is high = logic 1
}
```

Option C

```
DDRD = 0x00;
PORTD |= (1 << PD5);
if( PIND && (1 << PD5 ){
 // executes if the volatge on pin D5 is high = logic 1
}
```

Option D

```
DDRD = 0x00;

PORTD |= (1 << PD5);
char pressed = PIND & ~(1 << PD5);
if( pressed ){
 // executes if the volatge on pin D5 is high = logic 1
}
```

Option A

Option B

Option C

Option D

✔ Correct

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Q13
6 Points

Assume we have two pushbuttons connected to port `C3` and `C2` of our Arduino. They each require a pull-up resistor to be enabled. How would we do that and then check whether the input voltage on pin `C3` is actually a `1` while at the same time the voltage on `C2` is a `0`

Option A:

```
DDRC = 0x00;
PORTC |= 0x0c;
if( (PINC & (1 << PC3 | 0 << PC2) ){
 // executes if the voltage on pin D5 is high = logic 1
}
```

Option B:

```
DDRC = 0x00;
PORTC |= 0x0c;
char status = PINC & 0x08;
if( status ){
 // executes if the voltage on pin C3 = 1 and C2 = 0
}
```

Option C:

```
DDRC = 0xff;
PORTC |= 0x0c;
char status = PINC & 0x0c;
if( status == 0x0c ){
 // executes if the voltage on pin C3 = 1 and C2 = 0
}
```

Option D:

```
DDRC = 0x00;
PORTC |= (1 << PC3) | (1 << PC2);
char status = PINC & 0x0c;
if( status == 0x08 ){
 // executes if the voltage on pin C3 = 1 and C2 = 0
}
```

Option A

Option B

Option C

Option D

✔ Correct

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Q14

6 Points

Suppose we are using all 8 bits of `PORTD` as outputs (already setup in the `DDR` register) but don't know what is in `PORTD` prior. We want to assign the value 0x3a into `PORTD`. What would be the correct way to achieve this? (Select all correct answers)
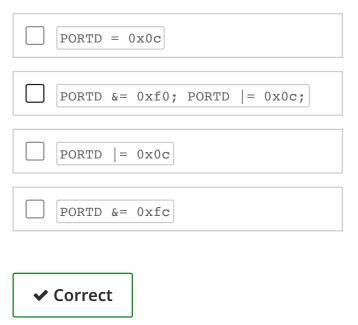
☐ `PORTD = 0x3a`

☐ `PORTD |= 0x3a`

☐ `PORTD |= 0x3a; PORTD &= 0x3a;`

☐ `PORTD = 0; PORTD |= 0x3a;`

✔ Correct

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Q15

6 Points

Suppose we are using all 8 bits of `PORTD` as outputs (already setup in the `DDRD` register). The upper 4-bits (i.e. bit 7 through bit 4) are being used to control one set of LEDS while bits 3 through 0 are controlling another. If we want only the LED's associated with bit 3 and 2 to turn on and the LEDs associated with bit 1 and 0 to turn off but not affect the LED's on bits 7-4, how should we do it?

(Check all correct answers)

☐ `PORTD = 0x0c`

☐ `PORTD &= 0xf0; PORTD |= 0x0c;`

☐ `PORTD |= 0x0c`

☐ `PORTD &= 0xfc`

✔ **Correct**

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Q16

8 Points

How could we copy the upper 3 bits of `PORTD` to the upper 3 bits of `PORTB`

```
PORTB = (PORTD & 0xe0);
```

```
PORTB = PORTD;
```

```
PORTB &= ~(PORTD & 0xe0);
```

```
PORTB &= ~(0xe0); PORTB |= (PORTD & 0xe0);
```

✔ **Correct**

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Save All Answers   Submit & View Submission ❯

Q16