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ENABLING A DIGITAL INPUT (3.0/3.0 points)

To make a pin a digital input, what value do you load into corresponding bits the following registers? Assume it does not need an internal pullup.

DIR

0

0

Answer: 0

PUR

000000

000000

Answer: 0

PCTL

000000

000000

Answer: 0

AFSEL

00000

00000

Answer: 0

AMSEL

000000

000000

Answer: 0

Help

DEN

Answer: 1**EXPLANATION**

To make an input we make DIR 0 to specify input, make PUR 0 because we do not need internal pullup, PCTL and AFSEL 0 because it is general purpose I/O, AMSEL 0 because it is digital not analog, and make DEN 1 to enable the digital pin.

ENABLING A DIGITAL OUTPUT (3.0/3.0 points)

To make a pin a digital output, what value do you load into corresponding bits the following registers? Assume it does not need an internal pullup.

Help

DIR

Answer: 1

PUR

Answer: 0

PCTL

Answer: 0

AFSEL

Answer: 0

AMSEL

Answer: 0


DEN

Answer: 1**EXPLANATION**

To make an output we make DIR 1 to specify output, make PUR 0 because we do not need internal pullup, PCTL and AFSEL 0 because it is general purpose I/O, AMSEL 0 because it is digital not analog, and make DEN 1 to enable the digital pin.

Help

Which line of C code is a friendly way to set Port B bit 2 assuming this pin has already been initialized as an output?

- ☐ GPIO_PORTB_DATA_R = 0x00;
- ☐ GPIO_PORTB_DATA_R = 0x02;
- ☐ GPIO_PORTB_DATA_R = 0x04;
- ☐ GPIO_PORTB_DATA_R |= 0x02;
- ☒ GPIO_PORTB_DATA_R |= 0x04; 
- ☐ GPIO_PORTB_DATA_R &= 0x02;
- ☐ GPIO_PORTB_DATA_R &= 0x04;
- ☐ GPIO_PORTB_DATA_R &= ~0x02;
- ☐ GPIO_PORTB_DATA_R &= ~0x04;

EXPLANATION


A bitwise OR operation of a hex value containing "1"s in only the bits corresponding to the pins you wish to modify with the target register is friendly because it will only modify the bits you wish, and will not modify other pins controlled by the register. This is because $1|X=1$ and $0|X=X$. A bitwise AND and a straight assignment ($=$) are not friendly operations because they could potentially modify all bits in that register.

Check

Hide Answer(s)

WRITING FRIENDLY CODE (1/1 points)

Which line of C code is a friendly way to clear Port B bit 2 assuming this pin has already been initialized as an output?

- ☐ GPIO_PORTB_DATA_R = 0x00;
- ☐ GPIO_PORTB_DATA_R = 0x02;
- ☐ GPIO_PORTB_DATA_R = 0x04;
- ☐ GPIO_PORTB_DATA_R |= 0x02;
- ☐ GPIO_PORTB_DATA_R |= 0x04;
- ☐ GPIO_PORTB_DATA_R &= 0x02;
- ☐ GPIO_PORTB_DATA_R &= 0x04;
- ☐ GPIO_PORTB_DATA_R &= ~0x02;
- ☒ GPIO_PORTB_DATA_R &= ~0x04; 

EXPLANATION


A bitwise AND operation of the complement of a hex value containing "1"s in only the bits corresponding to the pins you wish to clear with the target register is friendly because it will only clear the bits you wish, and will not modify other pins controlled by the register. This is because $1\&\sim 0$ and $0\&\sim X=X$. A bitwise OR and a straight assignment ($=$) are not friendly operations because they could potentially modify all bits in that register.

you wish to modify with the target register is friendly because it will only modify the bits you wish, and will not modify other pins controlled by the register. This is because $1 \& X = X$ and $0 \& X = 0$. For example, $0x00000004$ is binary $0000...0100$, and its complement is $1111...1011$. Bitwise AND of this complement with the DATA register will modify only bit 2, as all other bits in the operand are 1. A bitwise OR can not be used to clear bits, and a straight assignment ($=$) is not a friendly operation because it could potentially modify all bits in that register.

[Check](#)[Hide Answer\(s\)](#)

DEBUGGING TECHNIQUES (1/1 points)

Which debugging instrument can measure voltage versus time?

- ☐ Heart Beat
- ☒ Oscilloscope 
- ☐ Logic Analyzer
- ☐ LED
- ☐ Data Dump

[Help](#)


EXPLANATION

Heart beat is a flashing light. The logic analyzer measures digital signals versus time. The LED shows a binary state (ON or OFF). A data dump collects (logs) software data during execution.

[Check](#)[Hide Answer\(s\)](#)

DEBUGGING TECHNIQUES (1/1 points)

Which debugging instrument can measure multiple digital signals versus time?

- ☐ Heart Beat
- ☐ Oscilloscope
- ☒ Logic Analyzer 
- ☐ LED
- ☐ Data Dump

EXPLANATION

Heart beat is a flashing light. An oscilloscope measures analog signals versus time. The LED shows a binary state (ON or OFF). A data dump collects (logs) software data during execution.

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