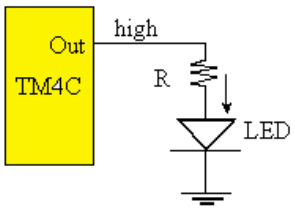
CALCULATING RESISTOR VALUES (2/2 points)

Choose the resistor value in the following figure if the desired LED operating point is 1.2 V and 2 mA. Assume the output high voltage V_{OH} of the microcontroller is 3.2 V.



Help

1000

\[1000\]

Answer: 1000

EXPLANATION

R = (3.2-1.2)/2mA = 1000 ohms

Check Hide Answer(s)

CLOCK INITIALIZATION (2/2 points)

8.2 What value do you put in the place xxxx to enable the clock for Port B? Show the answer as an 8-bit hexadecimal value. For example, if you wish to answer hex 6A, then enter the value 0x6A (0x followed by exactly two hex digits.)

SYSCTL_RCGC2_R |= xxxx;

0x02 **Answer:** 0x02

EXPLANATION.

Bits 5,4,3,2,1,0 in this register activate ports F,E,D,C,B,A respectively

Check Hide Answer(s)

ENABLING DIGITAL PINS (2/2 points)

To make a port pin a regular digital input/output, we have to enable its clock, clear bits in AFSEL, clear bits in AMSEL, set bits in DEN, and select input/output using the DIR. In addition to these four steps, we must configure the **PCTL** register. Which of the following C line modifies Port B bit 4 to be a digital pin in a friendly way?

- GPIO_PORTB_PCTL_R |= ~0x000F0000;
- GPIO_PORTB_PCTL_R |= 0x000F0000;
- GPIO_PORTB_PCTL_R &= ~0x000F0000; ✔
- GPIO_PORTB_PCTL_R &= 0x000F0000;

EXPLANATION

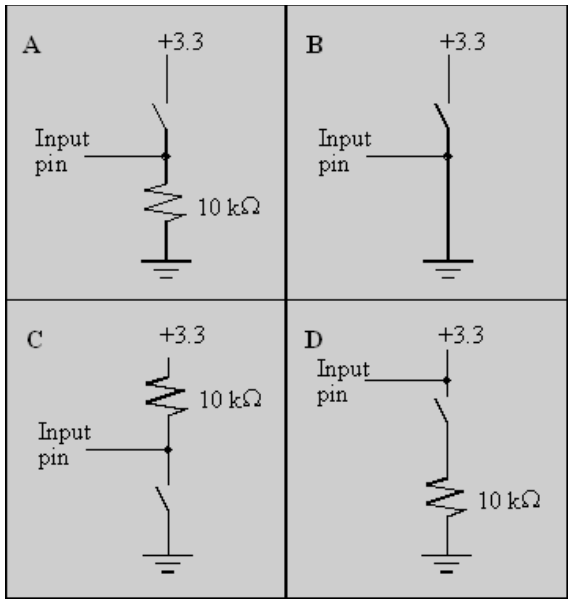
We need to clear bits 19-16 in the PCTL register. A bitwise OR operation will set bits. This is because 1|X=1 and 0|X=X. A bitwise AND with zero will clear bits. ~0x000F0000 is equal to 0xFFF0FFFF, with zeros in bits 19-16. Straight assignments (=) are not friendly operations because they could potentially modify all bits in that register.

Help

Check Hide Answer(s)

SWITCH INTERFACE (2/2 points)

Which circuit properly interfaces a switch in negative logic? Negative logic means the true state (switch pressed) has a lower voltage than the false state (switch not pressed.)



- A
- B
- C ✔
- D

EXPLANATION

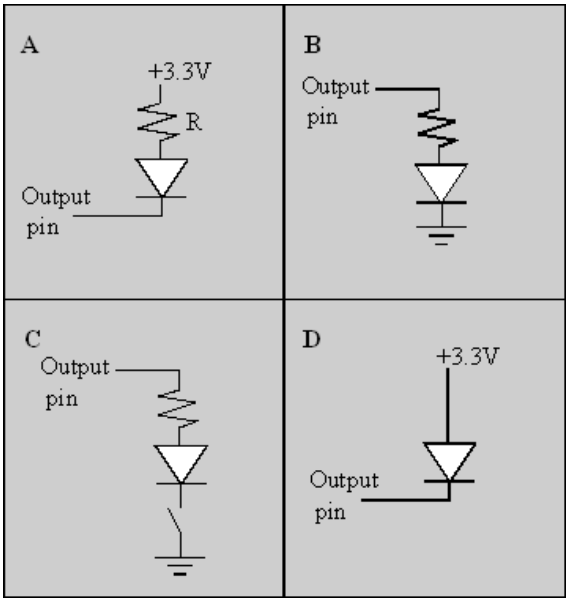
When the switch is pressed, the microcontroller sees 0 voltages. When the switch is not pressed the microcontroller sees +3.3V. In circuit A, the interface is positive logic. In circuit B, the microcontroller input is always 0, and sparks will fly when you press the switch. In circuit D, the microcontroller input is always 3.3V.

Check | Hide Answer(s)

LED INTERFACING (2/2 points)

Which circuit properly interfaces an LED in negative logic? Negative logic means the true state (output of the microcontroller with LED on) has a lower voltage than the false state (output of the microcontroller with LED off.)

Help



- A ✔
- B
- C
- D

EXPLANATION

A microcontroller output of zero turns on the LED. A microcontroller output of 3.3V turns off the LED. In circuit B, the interface is positive logic. Circuit C is wrong because there is no need for the user to push a switch to turn on the LED,

and it is positive logic. In circuit D, the current will be too large, because over 3V will be applied to the LED.

Check | Hide Answer(s)