

Answer each of the following problems on the paper provided. Neatness and organization will influence the grading of your exam. If you feel information you need to solve a problem is missing from the problem, state that and state the assumptions under which you will solve the problem. If the assumptions are reasonable and correct, the problem will be graded under those assumptions. You may use a laptop or tablet to access electronic versions of the technical documentation and lecture slides.

Otherwise, Closed neighbors.

Carefully read the questions, take your time, think, and then answer.

All questions are worth 10 points unless otherwise stated.

1. The C language does not have a logical exclusive-or operator. Assume **A** and **B** are logical variables, e.g. **bool A, B;** with values of **A = true**; and **B = false**; Write a C conditional expression that computes the logical exclusive-or of **A** and **B**. EXOR
- bool c may true or false;  
 $(A == \text{true}) \oplus (B == \text{false})$   
 $(C == \text{true})? A : B$

2. What is the metric unit of energy? What is the metric unit of power?

energy : Joule

power : Watt

A	B	C
true	true	false
true	false	true
false	true	true
false	false	false

3. In C, the for-loop has four clauses (components):

```
for ( <Initialization Clause>; <End Conditional Clause>;
    <Advance Clause> ) {
    <Body Statement Clause>
}
```

Explain (Describe) the order of execution for the first iteration of the for-loop.

if one variable is initialized when enter <Initialization Clause>, do not satisfy the <end Conditional Clause>, and then execute <Body Statement Clause>. Finally; the variable execute <Advance Clause>. This is the first iteration of the for-loop

4. What is the size of the LM3S1968 micro-controller Flash Memory?

256KB

5. What is the name of the DriverLib subroutine used to initialize the system clock on the LM3S1968 micro-controller?

void SysCtlClockSet(unsigned long ulConfig)

6. An int32\_t variable has the value 542 base 10. Express this value in hexadecimal using C syntax.

$$0x21E = 0x0000021E \quad \text{32 bits.}$$

7. You need to write a value to pins 3 and 7 of GPIO PortD. Both pin 3 and pin 7 should be set to a high (3.3 VDC) voltage. Write the statement (DriverLib subroutine call) you would use to accomplish this operation.

GPIOPinWriter(GPIO\_PORTD\_BASE, GPIO\_PIN\_7 |  
GPIO\_PIN\_3, 0x88);

8. Name two attributes of real-time, embedded systems that differentiate them from more conventional, desktop computing.

Real time:

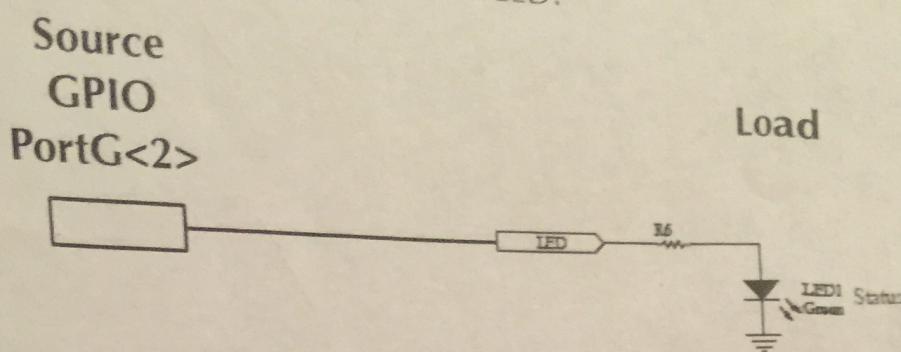
Safety and Physical and Long life spans,  
Sensors have to be measured on a periodic basis,

Tasks have to complete by a deadline

Actions must take place at specific time  
9. The SysTick frequency is 10 KHz. How many SysTick counts are necessary for a 200 mS (0.200 S) interval?

$$0.2 \text{ S} \times 10 \times 10^4 (\text{Hz}) = \underline{2000} \text{ (SysTick counts)}$$

A circuit is used to drive a LED:



If the GPIO source voltage is 5.0 VDC and the voltage across the resistor (R6) is 3.6 VDC, what should be the value of the resistor to limit current to 3.0 mA (0.003 A)?

Parallel circuit :  $R = \frac{V}{I} = \frac{3.6 \text{ VDC}}{0.003 \text{ A}} = 1200 \Omega$

11. Suppose a system has five (5) states, S0, S1, S2, S3, and S4. Write a C statement that allows you to use these names in your program.

enum States { S0, S1, S2, S3, S4 };

12. Describe the flowchart symbol that represents an off-page connection.



13. A program uses the following subroutine call to read data from GPIO port D (assume the GPIO port has been properly initialized):

```
Data = GPIOPinReadC(GPIO_PORTD_BASE,  
                      GPIO_PIN_2 | GPIO_PIN_5 | GPIO_PIN_7);
```

If pin 0 has a high voltage (3.3 VDC), pin 2 has a high voltage (3.3 VDC), pin 5 has a low voltage (0.0 VDC) and pin 7 has a high voltage (3.3 VDC), what value, expressed in hexadecimal, is returned?

The Pin 0 is not configured to Read!  
Assume Read three Pins 2,5,7: 0x 84

14. What is the operator for a bit-wise exclusive-or in C?

$\wedge$

/

15. What is the base memory address of GPIO PortH?

0x4002.7000

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===== Scratch Space