1. (10 points) **Electrical circuits**

For the circuit below containing a voltage source and four resistors, determine the following.

a. The equivalent resistance of the $4\,\Omega$, $8\,\Omega$, and $8\,\Omega$ resistors in parallel: __________
b. The equivalent resistance of all five resistors: __________
c. The current, $I$, flowing in the circuit: __________
d. The voltage measured by meter 1: __________
e. The voltage measured by meter 2: __________

![Circuit Diagram]

\[ V_s = 5 \, \text{V} \]

2. (15 points) **Logical operations**

a. For the logic circuit shown, calculate the value of $X$ for the inputs shown and show the result on the truth table below.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

b. Write the logical expression for $X$ using the words “OR”, “AND” and “NOT” for the logical operations. Something in the form of \( X = (A \lor B) \land (\neg B) \).
c. Assume A and B are inputs to Arduino ports PC0 and PC1 and there is an LED attached to PD5 as shown in the schematic. Implement the logic function from above in C code, and if X is zero, make the LED blink at a 2Hz rate. If X is a one, make the LED blink at a 1 Hz rate. For both rates the LED should be on for half the period and off for the other half. Use the _delay_ms(int milliseconds) function to help you.

**Note 1:** Once your program checks the inputs and determines a blink frequency, do one complete blink cycle before checking again. You do not have to change the blink frequency in the middle of a blink cycle.

**Note 2:** Assume other logic circuitry is providing the signals on A and B (not switches or pushbuttons.)

```c
#include <avr/io.h>
#include <util/delay.h>

int main(void)
{

```