1. Describe two differences between I2C master and slave devices?

- The I2C master sends out the address of a slave device that it intends to send data to or read from, whereas the slave device typically has its own address hardcoded or hardwired
- The I2C master can coordinate with other master devices to deactivate itself to prevent bus conflicts if another master device is transmitting or reading data already, whereas the slave device does not normally have such capabilities since it utilizes an addressing system. They can only respond to transaction requests, not start or manage them.

2. What are the two connections in an I2C bus? Describe their purpose.

The two connections in an I2C bus are SDA and SCL. SDA stands for "Serial Data", and is the main data transition line, while SCL is "Serial Clock", and provides a clock pulse to synchronize a master and slave device during data transmission.

3. What is the difference between open-drain and push-pull outputs?

Open-drain devices are only capable of pulling the output "low" and thus require a pull-up resistor or some external method to pull a line high after the fact. Push-pull outputs on the other hand have drive transistors capable of pulling a line both low *or* high. This is risky as it may allow for conflict in communication between devices that could lead to physical damage if one device pulls a line high and the other pulls low.

4. What is the purpose of the I2C restart condition?

An I2C restart condition is utilized in order to start a new transaction with a changed read/write bit. This allows communication to continue without interference from other devices that may attempt to take control of the bus after a stop condition is set.

5. What peripheral register would you use to set the read/write direction of the next I2C transaction?

You would use the I2C_CR2 register's RD_WRN bit to set the read/write bit of the next transaction.

6. The 10-bit SADD bit-field holds the slave device address. Since standard I2C addresses only use 7 bits, to which bits in the bit-field would you write the shorter address?

You write to the bits [7:1] within the bit field. This is odd because it is in the "center" of the register rather than being aligned on one end or another.

7. Name one thing you found confusing or unclear in the lab.

Why do we need to add additional jumpers and resistors ourselves? Does the Discovery board not have built-in pull-ups for onboard devices?