Multiple Choice

1. Hours of sleep and hours of study are features, and test scores are the respective classes. Using a "0R" rule learner, what will be the rule in this case?

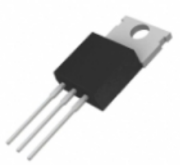
Hours of sleep	**Hours of study**	**Test score**
8	8	100
4	4	80
10	6	100
4	6	90
6	4	90
8	0	70
12	4	90
2	2	80

a. 100
b. 90
c. 80
d. 70

Answer: B. 90. Since the "0R" rule learner uses the majority as its prediction, it will choose a test score of 90 as it appears the most

2. Which part from the kit distributed in class is incorrectly named and what should the proper name be?

Item Label	**Part**	**Name**
I.		Thermistor
II.		Resistor
III.		Capacitor

VI.		Voltage Regulator

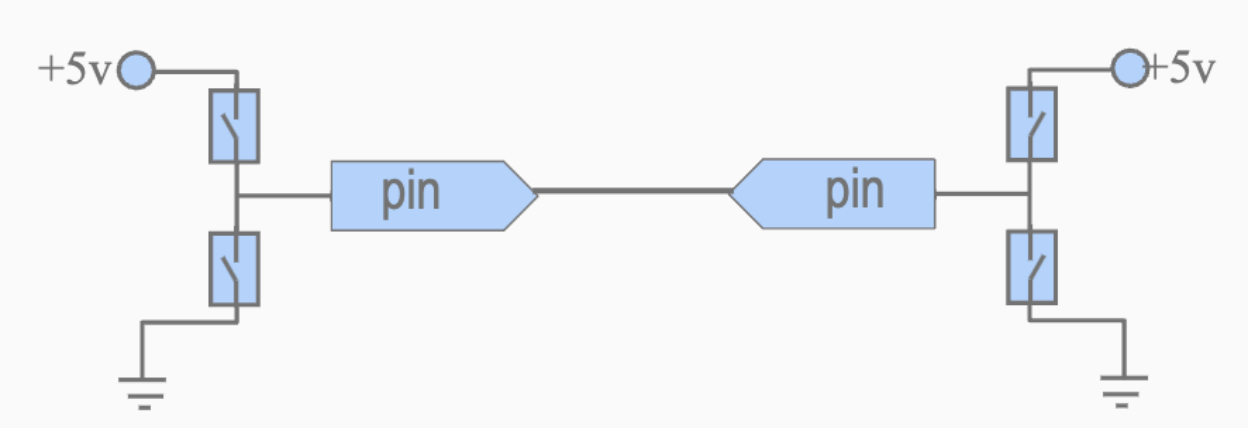
a. I. Photocell/photo-resistor
b. II. Capacitor
c. III. Resonator
d. VI. ATMEGA 328 chip

Answer: I. Photocell/photo-resistor as the image is not actually showing a thermistor. A thermistor can look more like a capacitor or the one given in class was more cylindrical shaped with red cylinders within it.

3. Which of the following is not one of the 18 design guidelines?
    a. Remember recent interactions
    b. Update and adapt cautiously
    c. Discourage feedback
    d. Notify users about changes

Answer: c. Discourage feedback. The design guidelines actually encourage granular feedback.

4. Circuit diagram and point out whats wrong



    a. Needs a current limiting resistor
    b. Output pin is connected to the input pin
    c. Both A and B
    d. There are no issues with this diagram

Answer: A. Needs a current limiting resistor. This is because one side could be high and the other could be low

5. Which has the correct description of its respective sensor
    a. Passive infrared sensor: can detect solid or liquid targets without physical contact, the sensors emit an electrical field from the sensing end of the sensor
    b. Accelerometer: measures the orientation and angular velocity from a spinning wheel in which the axis of rotation is free to assume any orientation by itself
    c. Sonar: measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal

d. Inertial Measurement Unit (IMU): measures infrared light radiating from objects in its field of view

Answer: c. Sonar. Sonar sensors are also called ultrasonic sensors with the goal to measure the distance from objects in front of it.

Long answer

1. Summarize and discuss the central goal and the motivation of the "Digital Family Portrait?" Describe the design of this device and what sensors did they use? What were the final results?

   Answer:

The central goal of the "Digital Family Portrait" was to create an awareness display of elder activity for non-resident (typically remote) caregivers (e.g. adult children of the elderly.) This way it could give an improved peace of mind for remote families and then there is less pressure to institutionalize an elder struggling to live independently. The motivation is that there is a growing elderly population in the industrialized world, all the now retired baby-boomers are an example of this growing population. It is better for concerned families if their elders can stay in their homes longer, but the additional demographic of geographically distributed families is making it harder. Therefore, a device is proposed to give real-time insights into their loved one's daily life and well-being. It is designed to resemble a traditional picture frame with a digital upgrade. It featured four sections, each representing a specific aspect of daily life: health, relationships, activity, and events. Each category was visually represented by icons that varied in size and color based on the level of measurement. The frame's design incorporated a clockwise motion, with the current day's information prominently displayed at the top, allowing users to quickly grasp changes over time. The sensors on the digital family portrait were designed to gather data on the individual's daily activities, which included: motion sensors (activity tracking), temperature sensors (health monitoring), light sensors (sleep pattern tracking), microphones (social interaction detection. They introduced the device into three families. The digital family portrait proved effective in providing a qualitative representation of the individual's daily life. Family members reported an improved sense of connection with their elderly relatives and peace of mind knowing their well-being was being monitored. Overall, the digital family portrait showed potential to support the independent living of elderly adults while maintaining a relationship with extended family.

2. What is ubiquitous computing and who coined the term? How did their initial vision of ubiquitous computing differ from our current reality?

   Answer:

Ubiquitous computing is a vision of a world where computing is everywhere. It's embedded in everyday objects, interconnected through wireless networks and accessible from anywhere, at any time. The term was coined by Mark Weiser in 1988 who is a chief scientist at the Xerox Palo Alto Research Center. He was the one who envisioned a third wave of computing. He thought computers would be in every room with hundreds of wireless computers in every office. They would become so integrated into the environment that these computers would recede into the background and become invisible to the user. The computers would provide an enhanced reality by providing information and tools and not to be used to create a separate virtual reality. Finally, he proposed a range of computer sizes from inch-scale tabs to yard-scale boards to accommodate different tasks and environments. However, the current reality definitely differs from what he thought it would become. People today do not have hundreds of computers in their homes, there

are computers typically for specific tasks that are not seamlessly integrated into everyday life. There are not multiple computers working and communicating together which is what Weiser envisioned. It only really works if a company has an entire line of products like Apple where it wants its buyers to buy all of their products so it can seamlessly integrate together. But for companies that only focus on specific products, trying to integrate different devices may just be not feasible. Next, computers are still visible and not separate from the environment. They are not fully integrated into objects or spaces, and they can be an eyesore in some situations. They are starting to integrate televisions into paintings to combat this issue and then have it further fade into the background. Devices now, like cell phones and laptops, are designed to be mobile. They are not fixed in place and can be taken with a user wherever they go. Finally, while Weiser did mention that privacy concerns could be an issue with ubiquitous computing, the privacy challenge is even greater than he imagined. Now there is a widespread collection and storage of personal data by technology companies and governments which is a privacy concern we are sifting through today.