Long Answer:

Question 1: In class discussions, after reading a few research articles, we discussed the complexities of installing sensors within home environments. Discuss the challenges associated with sensor installations in home environments, and what were some potential ways to mediate the challenges?

Answer: We discussed many challenges associated with sensor installations in home environments. Challenges range from the technical issues and difficulty in installing the sensors in the first place to privacy concerns, leading to an overall lack of user acceptance. In a study where 15 families were asked to install sensors from kits, only 75% of sensors were installed correctly and multiple families had difficulties positioning and pointing directional sensors. Participants were also concerned about the placements of these sensors as they could be accessible to pets and children as well as the aesthetics of the sensors. Another significant challenge is privacy concerns particularly around the installation of cameras or microphones. In the same study, 2 users refused to install cameras at all. Participants were adamant in their privacy concerns with bringing the sensors into the home. Understandably, many felt as though this was a very intrusive act, and user acceptance was a significant challenge.

To make home sensing less intrusive, we discussed projects like the Hydrosense project which uses pressure sensors screwed onto open faucets. Sensors were installed without invasive modifications which can improve user acceptance. Other sensors like the pressure changes in HVAC can also help mediate some challenges of privacy concerns (as users did not like cameras and microphones). This system would instead detect people walking through doorways as pressure shifts in air handling systems.

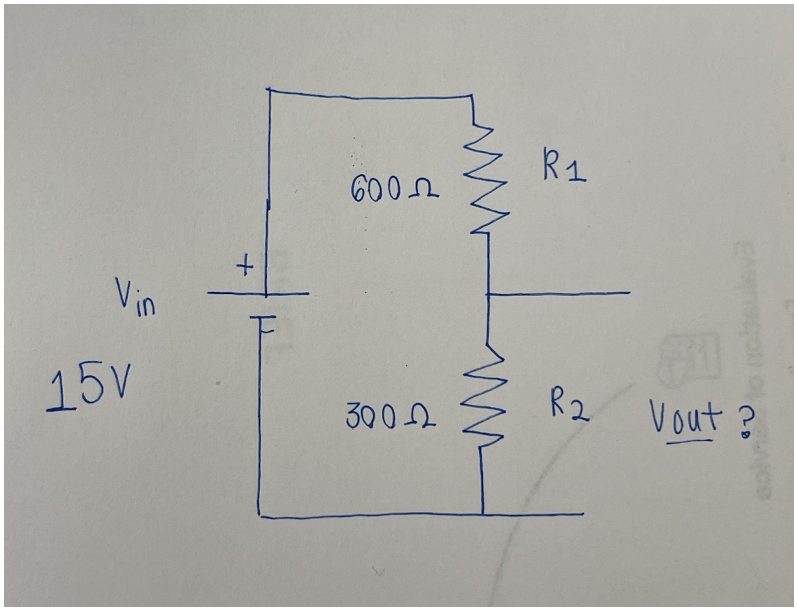
Question 2: How does Herbert Simon's Notion of Attention relate to the challenges of information overload in today's information age? What does that mean for UI design?

Answer: Herbert Simon introduced the economic principles of this notion through a neighbor's pet rabbits. He illustrated how an overabundance of rabbits in a neighborhood can lead to a shortage in lettuce. This analogy was used to discuss today's dilemma of information overload. In this digital world, with so many sources of information such as social media, emails, and so many devices such as phones and

laptops around us, there's more information that we can reasonably consume. This leads to a shortage of our attention. Managing this as a scarce resource is important because it underscores the importance of designing interfaces that facilitate efficient attention allocation.

Simon's Notion to Attention highlights how UIs should minimize extra information in order to compete with the user's short attention. UI needs to be simple and needs to prioritize the presentation of the important information in order to also minimize cognitive overload and burden on the users. Knowing more about the user's state and their context will provide significant benefits to your design such as a more user-friendly experience.

Multiple Choice:
Question 1: What is Vout?



A: 10V
B: 15V
C: 3.5V
D: 5V

Answer: D. Using the voltage divider formula, we have Vout = Vin x (R2/R1+R2). In this case, it is x = 15 x (300/900) = 5.

Question 2: If you have a 6V power supply and want to light an LED that needs 20mA to operate, what value of resistor do you need?

A: 300
B: 30
C: 0.3
D: 3

Answer: A. This is because of Ohm's Law where V = IR. Here it is R = V/I so R = 6V/0.02 = 300.

Question 3: Which code snippet correctly sets up a speaker connected to D2 and makes it sound a tone?

A:

```
int speakerPin = 2;
void setup() {
        pinMode(speakerPin, OUTPUT);
}

void loop(){
        tone(speakerPin);
        delay(1000);
}
```

B:

```
int speakerPin = 2;
void setup() {
        pinMode(speakerPin, OUTPUT);
}

void loop(){
        digitalWrite(speakerPin, 1000);
```

```
        delay(1000);
}
```

C:

```
int speakerPin = 2;
void setup() {
        pinMode(speakerPin, OUTPUT);
}

void loop(){
        digitalWrite(speakerPin, HIGH);
        delay(1000);
        digitalWrite(speakerPin, LOW);
        delay(1000);
}
```

D:

```
int speakerPin = 2;
void setup() {
        pinMode(speakerPin, OUTPUT);
}

void loop(){
        tone(speakerPin, 1000);
        delay(1000);
        noTone(speakerPin);
        delay(1000);
}
```

Answer: D. For the speaker, it needs to use the tone and noTone function correctly.

Question 4: What term describes a measure of uncertainty, where reduced uncertainty corresponds to higher predictability and less information?
A: Ambiguity
B: Entropy
C: Obscurity
D: Variability

Answer: B. Shannon's Entropy we discussed in class is a measure of uncertainty.

Question 5: Which of the following describes the concept of "High" and "Low" in digital electronics?

A: "High" represents a voltage close to +5V, while "Low" represents a voltage close to 0V.
B: "High" represents a voltage above +5V, while "Low" represents a voltage below 0V.
C: "High" represents a voltage close to 0V, while "Low" represents a voltage close to +5V.
D: "High" and "Low" have no specific voltage associations.

Answer: A. High is a voltage close the power supply which is around 5V and Low refers to voltage close to ground with is around 0V.