CS1114 Function Design Recipe Problem Set

September 22, 2023

Instructions:

- You should work together in groups in class to solve these problems.

- Every student, however, must submit his or her own submission for credit.

- Questions do not necessarily appear in order of difficulty

- Each solution should be thoroughly **designed**, following each step of the design recipe in detail.

1. **Life Advice**

   Design a function that gives generic, age-appropriate life advice. Children get different life advice than do teens, who get different life advice from adults. For the purposes of this question, assume a child is 0-12, a teen is 13-19, and an adult 20 and above.

2. **42**

   42 is clearly the greatest number: the answer to life, the universe, and everything. Everyone knows this. So obviously this function should return 42, the only question is what format. Design a function named `format-42` that takes as input the format type (specifically whether they want it as a number, string, or an image). Your function should return 42 in the specified format. For images, make it size 30 font with green text, and for string, spell it out.

3. **Dress code**

   Design a function named `dress-code` that takes an event type as its input and returns a suggested attire. For a wedding the dress should be formal, for a beach party the dress should be casual beachwear, for a business meeting the dress should be business formal, and for any other event type, the suggestion should be smart casual.

4. **Tiered Parking Lot Fee Structure**

A city parking lot uses a tiered fee structure to charge drivers based on the number of hours they park:

1. First hour: $5
2. Subsequent hours up to 3 hours: $3 per hour
3. Beyond 3 hours: A flat fee of $15 plus $2 for every additional hour

This means:

- Parking for 1 hour costs $5.
- Parking for 2 hours costs $5 + $3 = $8.
- Parking for 3 hours costs $5 + $3 + $3 = $11.
- Parking for 4 hours costs $15 + $2 = $17.
- Parking for 5 hours costs $15 + $2 + $2 = $19.

Design a function named `tiered-parking-fee` that calculates the parking fee based on the number of hours a vehicle is parked.

5. **Mobile Data Plan**

My mobile data plans offer varying amounts of data at different prices. Up to 5GB costs $10, and every additional GB up to 10GB costs $2. Beyond 10GB, there's a flat fee of $25 plus $1 for every additional GB. Write a function to calculate the cost of my mobile data.

6. **Tour Guide**

You're a tour guide at a famous international museum. You're fluent in English, Spanish, and French. However, tourists from all over the world visit the museum, and they might approach you with questions in languages you don't speak.

Task: Design a function named respond-to-visitor that takes a language as input. The function should return an appropriate response based on whether you speak that language.

If the language is "English", respond "This artifact is from the 18th century." If the language is "Spanish", respond "Este artefacto es del siglo XVIII." If the language is "French", respond "Cet artefact date du XVIIIe siècle." For all other languages, respond "I'm sorry, I don't speak *language*.", replacing *language* with the language that they asked you about.

7. **State of Water**

Water, a fundamental molecule for life, exists in three states: solid, liquid, and gas. The state of water changes with temperature, and this behavior is crucial for understanding many natural phenomena. However, the temperature at which these changes occur varies depending on the temperature scale being used: Celsius, Fahrenheit, Kelvin, or Rankine. Design a function named determine-water-state that takes a temperature scale and a temperature value as inputs. The function should return the state of water at that temperature on the specified scale.