Warm up discussion problem:

According to unsubstantiated Internet legend, Albert Einstein created this riddle in the late 1800s, and claimed that 98% of the world population couldn't solve it. You should at least discuss methods for approaching the problem, which is often more important than getting the solution. Can you come up with creative ways to visualize the problem, or organize it in some systematic way? You should also brainstorm how you might write a computer program that would solve this riddle. In computer science, problems of this form come up a lot and are referred to as "constraint satisfaction problems". Here it is:

- In a street there are five houses, painted five different colors.
- In each house lives a person of different nationality
- These five homeowners each drink a different kind of beverage, smoke different brand of cigar and keep a different pet.
- Who owns the fish?

Necessary clues: The British man lives in a red house. The Swedish man keeps dogs as pets. The Danish man drinks tea. The Green house is next to, and on the left of the White house. The owner of the Green house drinks coffee. The person who smokes Pall Mall rears birds. The owner of the Yellow house smokes Dunhill. The man living in the center house drinks milk. The Norwegian lives in the first house. The man who smokes Blends lives next to the one who keeps cats. The man who keeps horses lives next to the man who smokes Dunhill. The man who smokes Blue Master drinks beer. The German smokes Prince. The Norwegian lives next to the blue house. The Blends smoker lives next to the one who drinks water.

Workshop:
Numbers

1. Show the result of evaluating each expression. Be sure that the value is in the proper form to indicate its type (int or float). If the expression is illegal, explain why.

   (a) `4.0 / 10.0 + 3.5 * 2`
   (b) `10 % 4 + 6 / 2`
   (c) **`abs`**`(4 - 20 // 3) ** 3`
   (d) `sqrt(4.5 - 5.0) + 7 * 3`

(e) `3 * 10 // 3 + 10 % 3`

2. Show the output that would be generated by each of the following program fragments.

   (a)
   ```
   x = 2
   y = 10
   for j in range(0, y, x):
       print(j, end='')
   print(x + y)
   ```

   (b)
   ```
   ans = 0
   for i in range(1, 11):
       ans = ans + i*i
       print(i)
   print(ans)
   ```

3. The Konditorei coffee shop sells coffee at $10.50 a pound plus the cost of shipping. Each order ships for $0.86 per pound + $1.50 fixed cost for overhead. Write a program that calculates the cost of an order.

4. In geometry, Heron's formula is named after Hero of Alexandria and states that the area of a triangle whose sides have lengths a, b, and c is:

$$s = \frac{a + b + c}{2} \qquad A = \sqrt{s(s - a)(s - b)(s - c)} \tag{1}$$

   Write a program to calculate the area of a triangle given the length of its three sides a, b, and c as input, and using Heron's formula.

5. Write a program to find the sum of the cubes of the first n natural numbers where the value of n is provided by the user.

6. A Fibonacci sequence is a sequence of numbers where each successive number is the sum of the previous two. The classic Fibonacci sequence begins: $1, 1, 2, 3, 5, 8, 13, ...$ Write a program that computes the nth Fibonacci number where n is a value input by the user. For example, if $n = 6$ then the result is 8.