### Writing Python Simulations

**Puzzle #1:** Find the expected output of the following code:

<table>
<thead>
<tr>
<th>(a):</th>
<th>Python:</th>
</tr>
</thead>
</table>
| | red = 4  
  if red < 3:  
    red = 5  
  if red > 3:  
    red = 3  
  print(f"Value of red: {red}") |

**Description of Output:**

<table>
<thead>
<tr>
<th>(b):</th>
<th>Python:</th>
</tr>
</thead>
</table>
| | coin = random.choice(['head', 'tail'])  
  if coin == 'head':  
    print('You won!')  
  else:  
    print('You lost.') |

**Description of Output:**

<table>
<thead>
<tr>
<th>(c):</th>
<th>Python:</th>
</tr>
</thead>
</table>
| | data = []  
  for i in range(1000):  
    guess = random.randint(1, 10)  
    if guess == 7:  
      d = {'win': 1}  
    else:  
      d = {'win': 0}  
    data.append(d)  
  df = pd.DataFrame(data) |

**Description of Program:**
**Puzzle #2**: Write the Python code to simulate 100,000 generic tests to test someone’s relation to Taylor Swift. The test has the following parameters: There is a 99% probability that an individual related to Taylor Swift will get a positive result (“true positive”). There is a 6% probability that an individual NOT related to Taylor Swift will get a positive result (“false positive”). About 1% of the world population is related to Taylor Swift.

<table>
<thead>
<tr>
<th>Algorithm:</th>
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<table>
<thead>
<tr>
<th>Simulation:</th>
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<thead>
<tr>
<th>Analysis:</th>
</tr>
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<tbody>
<tr>
<td><strong>(a):</strong> In our simulation of 100,000 tests, how many people were actually related to Taylor?</td>
</tr>
</tbody>
</table>

| | |
| --- | |
| **(b):** In our simulation of 100,000 tests, how many people tested to be related to Taylor? |

| | |
| --- | |
| **(c):** How many people tested positive to be related, but weren’t actually related? |