§I. Excel

1. Write an Excel IF statement that checks whether the contents of cell A1 are positive or negative and returns "POS" and "NEG," respectively. (Assume A1 can’t be zero.)

2. The projected 2011 Federal Income Tax Brackets\(^1\) appear in Table 1 below.

<table>
<thead>
<tr>
<th>TAX RATE</th>
<th>Married Filing Jointly 2011 Taxable Income</th>
<th>Single Filers 2011 Taxable Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Not over $17,000</td>
<td>Not over $8,500</td>
</tr>
<tr>
<td>15%</td>
<td>17,000 – 69,000</td>
<td>8,500 – 34,500</td>
</tr>
<tr>
<td>25%</td>
<td>69,000 – 139,350</td>
<td>34,500 – 83,600</td>
</tr>
<tr>
<td>28%</td>
<td>139,350 – 212,300</td>
<td>83,600 – 174,400</td>
</tr>
<tr>
<td>33%</td>
<td>212,300 – 379,150</td>
<td>174,400 – 379,150</td>
</tr>
<tr>
<td>35%</td>
<td>Over $379,150</td>
<td>Over $379,150</td>
</tr>
</tbody>
</table>

Table 1: 2011 Projected Federal Income Tax Brackets

Write an Excel nested IF statement to calculate the projected tax based on the value of taxable income in cell C2.

3. Write an Excel CHOOSE statement that returns “RED,” “GREEN,” or “BLUE,” respectively, based on the value of cell A1 (allowable values in A1 are 1, 2, or 3).

4. Write an Excel CHOOSE statement that returns the value of cells B2, C2, D2, or E2 (in that order) depending on the value of cell A2.

§II. Choose one system: Maple/Sage/Xcas, Matlab/Octave, or C/Java

1. MAPLE system:

   1. Write a Maple if statement that checks whether the value of the variable s is positive or negative and returns “POS” and “NEG,” respectively. (Assume s can’t be zero.)

   2. (a) Write a Maple if-then-elif statement to calculate the projected tax for single filers from Table 1 when the taxable income is given by the variable TaxableIncome.

      (b) Use your function to calculate the projected tax on a single filer with a Gross Taxable Income of $50,000 taking the standard deduction of $5,700. (Round to the nearest dollar.)

   3. (a) Write a for loop in Maple that adds the first 100 integers’ reciprocals.

      (b) Write a for loop containing an if statement in Maple that adds the prime integers between 1 and 542. (Note: Maple’s isprime(x) returns true if x is prime [probabilistically], otherwise false.)

   4. Write a while loop in Maple that adds integers’ reciprocals starting with 1 while \(1/n > 10^{-3}\).

   5. Research the “computational efficiency” of loops versus add statements in Maple.

\(^1\)From http://www.bargaineering.com/articles/federal-income-tax-brackets-projected.html
2. **Matlab/Octave**

1. Write a Matlab or Octave if statement that checks whether the value of the variable \( s \) is positive or negative and returns “POS” and “NEG,” respectively. (Assume \( s \) can’t be zero.)

2. Write a Matlab or Octave switch statement that returns “[255,0,0],” “[0,255,0],” or “[0,0,255],” respectively, based on the value of the variable \( \text{color} \) (allowable values in \( \text{color} \) are the strings “RED,” “GREEN,” or “BLUE”).

3. (a) Write a Matlab or Octave if-then-elseif statement to calculate the projected tax for married filers from Table 1 when the taxable income is given by the variable \( \text{TaxableIncome} \).

   (b) Use your function to calculate the projected tax on a married filer with a Gross Taxable Income of $100,000 taking the standard deduction of $11,400. (Round to the nearest dollar.)

4. Write a for loop in Matlab or Octave that adds the first 100 integers’ reciprocals.

5. Write a while loop in Matlab or Octave that adds integers’ reciprocals starting with 1 while \( 1/n > 10^{-3} \).

6. Research the “computational efficiency” of loops versus “vectorized” operations in Matlab or Octave.

3. **C/Java**

1. Write a C or Java if statement that checks whether the value of the variable \( s \) is positive or negative and returns “POS” and “NEG,” respectively. (Assume \( s \) can’t be zero.)

2. Write an C or Java switch statement that returns “[255,0,0],” “[0,255,0],” or “[0,0,255],” respectively, based on the value of the variable \( \text{color} \) (allowable values in \( \text{color} \) are the strings “RED,” “GREEN,” or “BLUE”).

3. (a) Write a C or Java nested if-then-else statement to calculate the projected tax from Table 1 when the taxable income is given by the variable \( \text{TaxableIncome} \).

   (b) Use your function to calculate the projected tax on a married filer with a Gross Taxable Income of $182,950 taking the standard deduction of $11,400. (Round to the nearest dollar.)

4. Write a for loop in C or Java that adds the first 100 integers’ reciprocals.

5. Write a while loop in C or Java that adds integers’ reciprocals starting with 1 while \( 1/n > 10^{-3} \).

6. Describe how the “test condition” changes in a C or Java loop when using an *entrance condition loop* versus an *exit condition loop*. Create a loop with an index variable \( i \) which executes exactly 5 times as a specific example.