Reading: Lecture notes on “Similarity” and “BLAST.” Write your answers in the space provided, or attach extra sheets as necessary.

1. What is the distance between each of these pairs of strings?
   (a) sporting
       spelling
   
   (b) communism
       columnist
   
   (c) ATTCTGGCC
       ATTTTAGCG

2. Show a sequence of edit operations (number of copy, change, insert, and delete) that will transform the first string in each pair into the second string:
   (a) clergy
       celebrity
(b) tempest
teapot

c) corollary
trolls

3. What sequence of edit operations is defined by the path in this matrix?

```
F L A G E L
F L O T L S A M U M
```

4. Use the “dot plot” method to align the two sequences shown below. The matrix has been drawn for you – you just need to fill it in and find a path. Don’t worry about finding the best alignment – just use the matrix to construct a plausible alignment.

```
G T T A C T
A T T T A C T A T A
```
Extra Credit

To find the best (lowest cost) sequence of edit operations to turn “flotsam” into “flagellum” we can use the dynamic programming approach described in the lecture notes. We need to add an extra row and column to the matrix and then fill in the cells so that the value at cell \((i, j)\) is the cost of transforming the first \(i\) letters of “flotsam” into the first \(j\) letters of “flagellum.” The new matrix is drawn below. Your job for this extra credit assignment is to fill in the matrix and use it to find the lowest cost sequence of edit operations. For the cost function, use:

- matching letters 0
- pairing two vowels 1
- pairing a vowel with a consonant or two consonants 2
- insert or delete 3

```
  F L A G E L L U M
F
L
O
T
S
A
M
```