De Bruijn Graph Exercise

Purpose: Students will create independent de Bruijn graphs, then merge the graphs. Once created, then the students will then attempt Eulerian walks to assemble the sequences.

Learning Objectives:

1) Learn how to create simple de Bruijn graphs with DNA sequence reads.
2) Learn the principles of graphing and walking.
3) Learn how to combine graphs from multiple reads to create an assembly (a contig).
4) Learn how sequencing gaps and repeat regions affect assembly.
5) Learn how increasing k-mer length affects de Bruijn graph creation.

STEP 1: Create k-mers and k-1 overlaps for each sequence.
STEP 2: Make De Bruijn graphs for each sequence separately.
STEP 3: Merge the 2 graphs.
STEP 4: Write out the resulting assembled sequence.
STEP 5: Scan or take a photo or your (legible and easy to read) answers. Post all three graphs to Canvas (no more than 3 files).

GRAPH PROBLEM (use other paper if necessary.)

Use a k-mer length of 5 (k-1=4) to make de Bruijn graphs and assemble the following reads.

2 Reads:

GATCCTATCCTAT TCCTATCCTAGG