Welcome to the **DNA-o-gram** Extra Credit challenge. To earn up to 10 extra credit points (this equals ONE EOR assignment and is added to your daily work and EOR points), complete the following tasks, prepare a document with your answers, and then upload the file to the link on the WEEBLY class webpage.

**PART 1 (5 pts)** Below are 3 secret messages from Mr. Roberts coded in the DNA language. To decode each **DNA-o-gram** message, copy and paste each DNA message into the DNA decoder at the following website: <http://www.thinkBiotech.com/DNA-o-gram> . Explain what each message says in ENGLISH and respond to message 3 with your own DNA-o-gram.

Message 1: **AAGGGCGGAGACGTACGTGTTTAAGCGCGTGTTGATGGCGGAGTCATGCGCGGCTAAATGCGTGTACTTATGGGAGGCTAGATGCGTATGGTCTAACTCCTCCTTGTCGTCGAATAAGCGATGAATATCAAAATGCTGCTTCTCGGCCTGCTTGTAGTG**

Message 2: **CAAGCGCTTCGTGTCCTTATGCGTGGAGTCTAGCTTGTAATGGTTGAGCTTATGAATATCAAAATGGTACTTTACGATCTTTAGATGGGTTAACTTGTCGTTGATGGCGGAATGGATGGAATGGCTCTTGTCGTCCGTGACCTTATGTGCATGCTATCAATGCTCGTACTTCGTGTTGGAGACATGTCAGGCTAAGTAATGGGCTAGGGAATGAATATCAAAGGCGACGTACGTGCTATGCGTGGAGTCTAGCTTGTAGTG**

Message 3:

**CCTGAGCGTGTTATGCTAGATGGCGCGGGCGACGATGTCGTTATGTAGCGTGTCATGGAAGATGTAGTCGTTATGGTTGGCATGCTTTATGGGGCGCGTGATGGAATGGAGGGCTAGATGGCTCGTGGATCAATGGGCGAAATGGTTGAGCTTATGGAATAAGGACTGCGTGCTCTTGGAGTTCGTGCGATGCTCGGCGGACTCCTTGGGGTTGTCATGGGCGAAATGGAGCTTGTACTTCTGGATGTTTCAATGTAGGGCGTAGCCATGCGTGGACTGATGTAGGAGCGTGTTATGGTTTCAGGGCTTATGGGCGAAATGGGCGTAGACCGTGGAGATGTCGCTGTCATGCTGGATCTGATGGAGCTTATGTAAGTCCTTATGGAAGGCGTAATGGAGGATGTCATGCTGGATGTCCTCGGCTACCTTGTAGATCTTGTCGTG**

**Part 2 (5 pts)** Explore the effects of various types of point mutations on your DNA-o-gram **message 1.**

A) Insert a 1 letter (A, T, C, G) **substitution** mutation somewhere in DNA message 1 (above) and then decode. Include the decoded English message after the mutation and explain if the mutation had a small or large effect on the message

B) Insert a 1 letter (A, T, C, G) **addition** mutation somewhere in DNA message 1 (above) and then decode. Include the decoded English message after the mutation and explain if the mutation had a small or large effect on the message

C) Remove **1** letter (A, T, C, G) causing a **deletion** mutation somewhere in DNA message 1 (above) and then decode. Include the decoded English message after the mutation and explain if the mutation had a small or large effect on the message

D) Remove **3** letters (A, T, C, G) causing a **deletion** mutation somewhere in DNA message 1 (above) and then decode. Include the decoded English message after the mutation and explain if the mutation had a small or large effect on the message