# Assignment Worksheet

# Exercise 1 – Similarity and Sequence Alignment

**Question 1**

How could the similarity between the two passages above be quantified? What must be done prior to determining the similarity of these passages?

**Question 2**

Considering amino acid residue chemical properties, explain why an alanine substituted with a serine is assigned a score of 1, while an alanine substituted with a tryptophan is assigned a score of -3 in the BLOSUM-62 substitution matrix.

**Question 3**

What is the total similarity score for these two aligned sequences?

Query: MGDVEKGKKIFIMKC

Subject 1: MGEVERGKKLFIMKC

**Question 4**

If the query sequence is aligned to a different subject sequence (given below), what is the similarity score?

Query: MGDVEKGKKIFIMKC

Subject 2: MCDVWKGKSIFIMKC

**Question 5**

Explain why the similarity scores calculated above are different. Consider and refer to information provided in Table 1 as part of your explanation.

**Question 6**

Some species have a common ancestor but have evolved to have different characteristics over time. This process is known as divergent evolution. Which of the two subject sequences most likely diverged evolutionarily longer ago from the query sequence?

What evidence did you use to determine your answer?

**Question 7**

Record the similarity (alignment) scores from the computational scoring.

Subject 1 sequence score \_\_\_\_\_\_\_\_\_

Subject 2 sequence score \_\_\_\_\_\_\_\_\_\_

Did the computationally calculated similarity scores match those that you manually calculated?

If not, work through the steps again and identify what might have caused the difference.