Show all of your work in solving the questions below.

Chapter 13 – Transposable Elements

1. Name and describe the important features of the two classes of eukaryotic transposable elements.

2. (p. 449, q. 7, modified). Prior to the integration of a transposon, its transposase makes a staggered cut in the host target DNA. If the staggered cut occurs at the sites of the arrows below, indicate the sequence of the host DNA (a) after the transposon is inserted, and (b) after the tranposon is excised.

   ▼
   A A T T T G G C C T A G T A C T A A T T G G T T G G
   T T A A A C C G G A T C A T G A T T A A C C
   ▲

Chapter 14 – Mutation, Repair & Recombination

3. (p. 478, q. 3). (a) Can a missense mutation of proline to histidine be made with a G≡C ⇀ A=T transition-causing mutagen? (b) What about a proline-to-serine missense mutation?

4. (p. 478, q. 7). (a) If the enol form of thymine is inserted on a single-stranded template during replication, what base-pair substitution will result? (b) If thymine enolizes while acting as a template during replication, what base-pair substitution will result?

5. (p. 479, q. 26). (a) Why is it impossible to induce nonsense mutations (represented at the mRNA level by the triplets UAG, UAA, and UGA) by treating wild-type strains with mutagens that cause only A=T ⇀ G≡C transitions in DNA? (b) Hydroxylamine (HA) causes only G≡C ⇀ A=T transitions in DNA. Will HA produce nonsense mutations in wild-type strains? (c) Will HA treatment revert nonsense mutations?
6. (p.480, q. 30). You are working with a newly discovered mutagen, and wish to determine the base change that it induces into DNA. Thus far, you have determined that the mutagen chemically alters a single base in such a way that its base-pairing properties are altered permanently. In order to determine the specificity of the alteration, you examine the amino acid changes that take place after mutagenesis. A sample of what you find is shown below:

- Original: Gln – His – Ile – Glu – Lys
  Mutant: Gln – His – Met – Glu – Lys

- Original: Ala – Val – Asn – Arg
  Mutant: Ala – Val – Ser – Arg

- Original: Arg – Ser – Leu
  Mutant: Gin – Ser – Leu – Trp – Lys – Thr – Phy

What is the base-change specificity of the mutagen?