

3. (10 pt) Describe the classical genetic experiments that provided proof that DNA polymerase III is the enzyme of replication in *E. coli*.

4. a)(8 pt) You have isolated 5 *Cys*⁻ mutants, which are each unable to grow on minimal medium in the absence of the organic growth factor cysteine. Given the following complementation results, how many distinct genes are represented in your collection of mutants, and which mutations, if any, are identical to each other?

	<i>cys-1</i>	<i>cys-2</i>	<i>cys-3</i>	<i>cys-4</i>	<i>cys-5</i>
<i>cys-1</i>	-	+	+	+	+
<i>cys-2</i>	+	-	+	+	-
<i>cys-3</i>	+	+	-	-	+
<i>cys-4</i>	+	+	-	-	+
<i>cys-5</i>	+	-	+	+	-

b)(8 pt) Mutant strain *cys-6* is shown to be a double mutant. How might you have determined that? What would happen if you used this strain in complementation tests?

7. (15 pt) a) Compare and contrast the packaging of prokaryotic chromosomes with that of eukaryotic chromosomes.

b) How do eukaryotes use radial loops to coordinate the expression of genes with related functions?

8. (10 pt) What nucleotide sequence pattern is often associated with DNA bends? Where would you expect to find such a pattern?