Answers to Exam 1 (2010).

1b. K and R are basic

2. B (meiosis I)
3. A (mitotic recombination)
4. A (Complementary strand)

5. Definitions
   A. “Synapsis” = “Occurs during prophase I when homologous chromosomes pair forming a tetrad.” Students received credit for mentioning the aligning or coming together of homologous chromosomes (1 point), the phase of meiosis in which it occurs (1 point), and the result (tetrad formation/crossing over, 1 point).
   B. “DNA primer” = “A short RNA oligonucleotide required to supply a free OH group on the 3’ end of DNA during replication.” Students received credit for mentioning that the oligo is made of RNA (1 point), that it is required for DNA replication (1 point) and that it facilitates the addition of nucleotides to the 3’ end of replicating DNA (1 point).
   C. “Genetic map” = “A representation of arrangement of genes/loci on a chromosome.” Students received credit for mentioning that a genetic map represents the arrangement/spacing (1 point) or genes/loci (1 point) on a chromosome (1 point).

6. a. F
   b. T
   c. T
   d. F
   e. T

7. 9%

8a. A
8b. B
8c. D
8d. C
8e. 50%
8f. 25%

9. a. his- LYS+; HIS+ lys-
   b. his- lys-; HIS+ LYS+
   c. HIS + LYS +; his- lys-; his- LYS+; HIS + lys-
   d. yes, 26.5 cM
10a. \(9/16 = 56\%\)
10b. \(1/7 = 14\%\)

11. a. \(P(0) = e^{-m}\)
   \[m = n \times p = 2000 \times 0.001 = 2\]
   \[P = 0.13533\]
To receive full credit students MUST have written out the equation they used as stated in the problem (-2 points for failing to write out the equation). Likewise, if students wrote out the equations but failed to get the correct answer they received 2 points of partial credit.

11b. \(Xr+Xb+/Y\) and \(Xr-Xb-/Y\) were both required for full credit. If other genotypes were given students received no credit. If one of the correct genotypes was given and no incorrect genotypes were given they received 1 point of partial credit.

11c. \(Xr+Xb-/Xr-Xb-\) and \(Xr-Xb+/Xr-Xb-\) were both required for full credit. If other genotypes were given students received no credit. If one of the correct genotypes was given and no incorrect genotypes were given they received 1 point of partial credit.

11d. \(RF = 0.002 = 0.2\% = 0.2\) cM

12.
   A. 10
   B. 14
   C. 14

13. The correct answer was F. Students who circled more then 1 answer did not received credit as stated in the problem.

14. F is the correct answer to question 13. This is because the score a particular alignment receives depends on how rewards and penalties are assigned to different parameters including exact identities, substitutions, and gap penalties. Depending on how these parameters are scored any of the above alignments could be “the best.”

Students who did not answer 13 correctly, but displayed a moderate understanding of how scores are assigned to alignments in their answer to question 14 could receive partial credit, i.e., students who pointed out differences in polar and nonpolar substitutions in alignment 2 and 3 and mentioned that these could still be rewarded received points (usual 3 or 4 depending on how insightful their answer was).