WEEK 3 QUIZ

TRUE/FALSE
1. αβ T cell receptors recognize intact protein antigens. False

MULTIPLE CHOICE
2. During class switch recombination, the enzyme AID acts on:
   A. RSS sequences
   B. Signal joints
   C. Coding Joints
   D. Switch regions
   E. None of the above

3. The following statement about somatic hypermutation is true
   A. It occurs during B cell development in the bone marrow
   B. It occurs in T cells after activation in the periphery
   C. It requires the enzyme TdT
   D. It increases the diversity of antibody constant regions
   E. None of the above

FILL IN THE BLANK
4. V, D and J segments are flanked by __RRS sequences__ that are recognized by to proteins, __RAG1__ and __RAG2__, which are only expressed in developing __lymphocytes (or B cells and T cells)__.

5. IgM and IgD can be expressed simultaneously on mature B cells due to __alternative splicing__ of RNA.

SHORT ANSWER
6. What is the function of the CDR loops in antibody heavy and light chains? Describe, at the DNA level, the basis for the variability of CDR1 and CDR2. Describe, at the DNA level, the basis for variability in CDR3. Why is variability in CDR3 generally higher than in CDR1 and CDR2? (Do not consider the role of somatic hypermutation)

The function of the CDR loops is to form the antigen-binding surface of the heavy and light chains. The basis for variability of CDR1 and CDR2 is that these are encoded by V segments. There are many different V segments in the genome and the greatest variability among the V segments is in the nucleotides encoding the CDR1 and CDR2 loops. The basis for variability of CDR3 is two-fold. First, CDR3 is encoded by the random recombination of V, (D) and J segments. Second, the joining of V, (D) and J segments is imprecise and leads to loss and addition of nucleotides. The reason that CDR3 variability is generally higher is that there are a finite number of V segments (and therefore CDR1 and CDR2 loops) whereas there are an almost infinite number of possible CDR3 loop sequences due to random gene segment usage and junctional diversity.