ANSWER KEY FOR PROBLEM SET #3

1. Unlimited growth of cells that robs the host of nutrients.
   Leukemia - white blood cell cancers originating in the bone marrow.
   Sarcomas - solid tumors from mesoderm tissue.
   Lymphomas - abnormally large numbers of lymphocytes originating in the lymph nodes or spleen.
   Carcinomas - solid tumors from epithelial tissue.

2. Environmental causes: Carcinogens such as components of cigarette smoke, asbestos, X-rays, and viruses. Genetic causes: Single-gene, polygenic inheritance, chromosome aberrations, and somatic mutation.

3. Treatments: Surgery, radiation, chemotherapy, immunological control and genetic control.

4.
   a) Schizophrenia: Most common mental disorder; onset in early adulthood; characteristic sweat variants.
   b) Manic Depression (Bipolar disorder): Alternate between euphoric, violent behavior and deep states of depression.
   c) Epilepsies (Seizures): Due in part to heredity; high fevers in childhood.
   d) Alcoholism: Brain degeneration; possible genetic involvement; alcoholic dehydrogenase; aldehyde dehydrogenase variants.
   e) Parkinson Disease: Loss of body control; do not metabolize dopamine normally.
   f) Huntington Disease: Autosomal dominant; degeneration of the brain; onset typically 40-45 years of age.

5. Trisomy 21, Trisomy 18, Trisomy 13, XXY, and XYY.


7. Better nutrition today, more people live to "old age," lifestyle changes, exposure to more mutagens and carcinogens today, use of antibiotics, immunizations, and other medical advances.
8. To help their clients comprehend the medical facts involved, 
appreciate the way heredity contributes to the disorder, 
understand the recurrence risks, choose the course of action 
which seems appropriate to them in view of their risk, the 
background, their religious perspectives, etc.

9. Evidence against A.D.: Expect at least one of the parents 
of III-2 and III-4 to be affected; A.R.: No evidence 
against; X.D.: All daughters of I-2 would have to be 
affected; Mother of II-4 would have to be affected; Mother 
of III-4 would have to be affected; One (or both) parent(s) of 
III-2 would have to be affected; X.R.: Expect father of 
III-2 to be affected; Expect all sons of II-6 to be affected; 
Y.: All sons of I-1 would have to be affected; Father of 
III-4 would have to be affected; No females could be 
affected.

ANSWER KEY FOR TEST #3 – April 22, 2005

1.a. –Due to many genes and many environmental factors, e.g. height, weight, IQ, mental illnesses

b. –Progressive loss of neurological function as a result of degeneration of brain tissue
   -Caused by multiple repeats of CAG within the gene
   -Autosomal dominant, locus located on chromosome #4

c. –DNA from 2 or more sources is cut into pieces using an enzyme. If the DNA 
samples are from different individuals, there will be a different # and different sizes of 
the pieces. When DNA is separated, the bands of different individuals can be 
distinguished.

d. –Production of eggs (oogonia)
   -Meiosis I – resumes for one cell each 28 days after puberty
   -Meiosis II – not completed unless the egg is fertilized
   -One egg from primary oocyte, along with 3 non-functional polar bodies

e. –Means that 78% of the factors that influence weight are due to genetics; the 
remaining ~22% of weight is determined by environment

2.a. T
    b. F – incomplete separation of MZ
    c. F - Rh
d. F - chromatids
e. T
f. F – Hyperplasia
g. F – Heart disease
h. F - Correlation

3.a. No
b. 16
c. No
d. ABCD (or any gamete with BC or bc regardless of A/a and D/d)

4.a. No – For II-3 to be affected, his mother (I-1) would have to be.
b. Yes
c. No – Two females are affected, Father/son discrepancy between II-1 and III-1
d. Yes
e. No – For III-2 to be affected, her father (II-1) would also have to be affected

5.a. D
b. C
c. C
d. E
e. D

6.a. Stung several times at one tournament. Weeks later stung again. Antibodies made after 1st exposure attacked antigens at 2nd causing swelling and much discomfort.
b. Exposure to polio as a child probably stimulated antibody production. Vaccine later in life was likely unnecessary.
c. Dr. McKenzie’s wife is Rh-, Dr. McKenzie is Rh+
   First child: Rh- ; RhoGAM was not necessary
   Second child: Rh+ ; RhoGAM injected into wife to destroy fetal Rh+ cells; thus preventing subsequent risk of Rh incompatibility for future Rh+ babies.

7. 8 points for a well thought out answer.

8. 8 points for a well-thought out, thorough Genetic in Human Affairs answer.

9. That both genetics and environmental play a significant role. This is because the fact that IQ correlations between an adopted individual and his/her biological family (parent = 0.36; sibling = 0.38) are positive. Also, the correlation values between him/her and his/her environmental family members (0.16 and 0.30).

ANSWER KEY FOR TEST #3 – November 22, 2005

1.a. –The spreading nature of cancer from the origin to new sites via circulatory or lymphatic system
b. –Restriction Fragment Length Polymorphism – DNA cut into pieces and separated, bands (DNA) of different individuals can be distinguished
   -Powerful means of determining identity
   -Used in forensics, paternity tests, accident victim ID, etc.

c. –A trait which is present at birth (regardless of cause: genetic or environmental)

d. –Mental illness characterized by severe mood swings
   -MZ:DZ concordance values indicate that genetics is a major factor

e. –This indicates that appx. 75% of the factors that influence weight are genetic ones, the remaining 25% is determined by environment

f. –Characteristic caused by some environmental exposure which resembles one caused by a gene (i.e. limb malformations due to thalidomide exposure prenatally)
   -looks like a phenotype, but is NOT caused by a genotype

2. a. B
   b. E
   c. F
   d. C or F
   e. E
   f. A

3. a. F – Oncogenes
   b. T
   c. F – mental retardation
   d. T
   e. T
   f. F – DZ, MZ

4. a. No – Females affected, Father/son discrepancy between II-1 and III-2
   b. Yes
   c. No – Daughter (II-2) of affected Dad (I-2) would have to be affected, Mother (II-2) of affected son (III-2) would have to be affected
   d. Yes
   e. No – One of parents (II-1 or II-2) of III-2 would have to be affected for III-2 to be affected

5. a. C
   b. C
   c. C
   d. C
   e. D
   f. B
6. a. Stung several times at one tournament. Weeks later stung again. Antibodies made after 1\textsuperscript{st} exposure attacked antigens at 2\textsuperscript{nd} causing swelling and much discomfort.
   b. Exposure to polio as a child probably stimulated antibody production. Vaccine later in life was likely unnecessary.
   c. Dr. McKenzie’s wife is Rh-, Dr. McKenzie is Rh+
      First child: Rh-; RhoGAM was not necessary
      Second child: Rh+; RhoGAM injected into wife to destroy fetal Rh+ cells; thus preventing subsequent risk of Rh incompatibility for future Rh+ babies.

7. a. UNCG, MS
   b. Emphasis on providing information, support, options, etc. WITHOUT telling clients what to do
   c. Excessive obesity; parents often must lock cabinets/refrigerator due to child’s insatiable appetite
   d. Reasons must explain genetically/socially why this may be true

8. Both genetics and environment contribute to intelligence. Genetics: adopted kids are similar in IQ scores to their biological family members. Environment: correlations are also positive for adoptive “family” members.

9. 4 points each for a well-thought out, thorough Genetic in Human Affairs answer.