Mathematics 210-1, FINAL EXAMINATION, December, 2002

1. (10 points) Give definitions of:

(a) two independent events;

(b) a strictly determined game.

2. (10 points) If p is false and q is true, find the truth value of $(q \wedge \sim p) \to (p \vee \sim q)$.

3. (20 points) A survey of members of a health club found that:

24 members swim;
32 members use exercise bikes;
20 members use weight machines;
8 members swim and use weight machines;
13 members use exercise bikes and weight machines;
12 use exercise bikes only;
5 members swim, use exercise bikes, and use weight machines;
6 members do not swim and do not use either exercise bikes or weight machines.

Use a Venn diagramm to determine how many members were surveyed.

4. (20 points) Given $P(A) = .4$, $P(B|A) = .25$, $P(B'|A') = .5$. Find $P(B)$.

5. (20 points) An experiment consists of randomly selecting one of two coins, tossing it, and observing the outcome - heads or tails. The first coin is a two-headed coin while the second is a fair coin. The probability of choosing the two-headed coin is 1/3. If the coin selected shows heads, what is the probability that this coin is the fair coin? Write the answer as a fraction.

6. (10 points) Suppose that Bryson has 6 shirts, 5 pairs of pants, and 3 pairs of shoes. How many outfits can he create if an outfit consists of one shirt, one pair of pants, and one pair of shoes? Explain.

7. (20 points) If three balls are drawn from a bag containing 4 red, 3 blue, and 2 yellow balls, what is the expected number of yellow balls in the sample? Give the answer as a decimal rounded to the nearest hundredth.

8. (5 points) Suppose that a student has test scores of 70, 78, 80, and 94. What is the student's mean score?

9. (20 points) Find the square of the standard deviation for the following grouped data. Simplify.

Interval	Frequency
1-3	5
4-6	2
7-9	1
10-12	2

10. (15 points) Use the Gauss-Jordan method to solve the following system of linear equations. Check your answer.

$$y - 2z = -5$$
$$x + 3y = 5$$
$$x + z = 5$$

11. (10 points) Find the product $\begin{pmatrix} 3 \\ 2 \\ -5 \end{pmatrix} \cdot \begin{pmatrix} 1 & 2 \end{pmatrix}$, if this product exists.

12. (20 points) Use the graphical method to solve the following linear programming problem.

$$\begin{array}{ll} \text{Maximize} & z = 2x + 3y \\ \text{subject to:} & 2x + 5y \leq 10 \\ & x - y \leq 1.5 \\ & x \geq 0 \\ & y \geq 0. \end{array}$$

13. (20 points) Remove any dominated strategies if they exist. Then check for a saddle point. Find the optimum strategies for players A and B. Give the value of the game. Is the game fair?

$$\begin{pmatrix} 2 & -1 \\ -3 & 4 \\ -6 & -5 \end{pmatrix}$$