Reference formulas:

Simple interest: \( A = P(1 + rt) \)

Compound interest: \( A = P(1 + i)^n \), \( i = r/m \)

Future value of an annuity: \( FV = PMT \frac{(1+i)^n - 1}{i} \)

Present value of an annuity: \( PV = PMT \frac{1 - (1+i)^{-n}}{i} \)

Sets: \( n(A \cup B) = n(A) + n(B) - n(A \cap B) \)

Probability: \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \)

Conditional probability: \( P(A|B) = \frac{P(A \cap B)}{P(B)} \)

Bayes: \( P(U_1|E) = \frac{P(U_1 \cap E)}{P(E)} = \frac{P(U_1 \cap E)}{P(U_1 \cap E) + \cdots + P(U_n \cap E)} \)

1. (10 points) An annuity pays 6% annual interest rate compounded annually. If $1000 is deposited into the annuity annually for two years, how much interest is earned during the second year?

2. (10 points) The annual payment on a 2-year loan is $1000. The interest rate is 6% compounded annually. How much interest is paid over the course of the loan?

3. (20 points) Compute the inverse of the matrix:

\[
\begin{bmatrix}
1 & 2 & 3 \\
3 & 5 & 11 \\
-1 & -1 & 4
\end{bmatrix}
\]

4. (10 points) Decide whether \([p \rightarrow q) \lor \neg q] \Rightarrow \neg p \land q\).

5. (10 points) 50 students were surveyed. Of those 50 students, 22 had soccer as a hobby, 20 had tennis as a hobby, and 10 had neither soccer nor tennis as a hobby. What is the probability that a randomly chosen person has both soccer and tennis as a hobby?

6. (10 points) A 5 person team is selected from a group of 5 women and 5 men. What is the probability that the team will have exactly 3 men and 2 women?

7. A box contains 2 red, 3 white, and 4 green balls. Two balls are drawn out of the box in succession without replacement.

- (10 points) What is the probability that both balls are the same color?
- (10 points) If the second ball is red, what is the probability that both balls are the same color?