The final exam will cover all sections seen in class. You should know general terms and definitions from each of these sections. Review previous exams, quizzes, homework assignments, and review sheets, and pay particular attention to the subjects outlined below.

1. Chapter 5
   (a) Converting between degree and radian angles.
   (b) Converting between decimal degrees and degrees minutes seconds.
   (c) Evaluating trigonometric functions using right triangles, special angles, and reference triangles.
   (d) Using a calculator to compute trigonometric functions in radians or degrees.
   (e) Graphing trigonometric functions, including period, amplitude, phase shift, and vertical shift.

2. Chapter 6
   (a) Memorization of trigonometric identities as listed on the identities handout.
   (b) Using trigonometric identities to verify other identities.
   (c) Using trigonometric identities to simplify computation.
   (d) Using trigonometric identities to solve equations.

3. Chapter 7
   (a) Using the law of sines and law of cosines to solve triangles.
   (b) Vector arithmetic: magnitude, addition, scalar multiplication, and dot-product.
   (c) Setting up and solving application problems using vectors and the laws of sines and cosines.
   (d) Converting complex numbers between $a + bi$ and trigonometric forms.
   (e) Using trigonometric form to multiply, divide, or find $n$th roots.
   (f) Converting between rectangular and polar coordinates and graphing polar equations.

4. Chapters 8 and 9
   (a) Solving systems of equations by graphing, substitution and/or addition.
   (b) Finding the partial fraction decomposition of a rational expression.
   (c) Solving systems of equations using augmented matrices and row reduction.
   (d) Matrix arithmetic: addition, scalar multiplication, matrix multiplication, finding inverses.
   (e) Solving systems of equations using the matrix equation and matrix inverses.
   (f) Solving systems of equations using determinants and Cramer’s Rule.

5. Chapter 11
   (a) Working with sequences, including arithmetic and geometric sequences.
   (b) Writing series in $\Sigma$-notation and re-indexing series.
   (c) Find the sum of arithmetic and geometric series.
   (d) Counting using the fundamental counting principle, permutations, combinations, and labeling.
   (e) Using the Binomial Theorem.
   (f) Simple proofs using the Principle of Mathematical Induction.
Below is a *sampling* of problems representative of the types you will see from sections 11.4, 11.5, and 11.7. See previous review sheets and exams for problems from previous sections.

1. Evaluate each of the following.
   (a) $10!$
   (b) $\frac{30!}{25!}$
   (c) $P(7, 3)$
   (d) $\frac{13!}{5!(13-5)!}$
   (e) $C(12, 5)$
   (f) $\binom{15}{5}$

2. Solve each of the following counting problems using appropriate counting techniques (counting principle, permutations, combinations, labels, etc.).
   (a) You have 15 dancing chickens, but the county fair only allows 6 chickens to line dance at any one time. In how many ways can you line up 6 of the chickens for a show?
   (b) A committee of seven professors wishes to select a bed-racing team of three individuals from amongst their ranks. In how many ways can this be done?
   (c) You wish to choose one of your 6 nieces and one of your 4 nephews to play Princes Leia and Luke Skywalker in your production of Star Wars, the musical. In how many ways can you choose the unfortunate cast?
   (d) A pizza parlor lets you choose one of 4 crusts, one of 4 sauces, and 3 of 16 toppings for their deluxe-do-it-yourself special. How many deluxe-do-it-yourself pizzas are possible?

3. Expand each power of a binomial, or find the term indicated.
   (a) $(x + y)^6$
   (b) $(2 + 3x)^3$
   (c) $(a - 4)^5$; find the 2nd and 5th terms
   (d) $(u - v)^{21}$; find the 5th and 18th terms

4. Use the Principle of Mathematical Induction to show that the following statements are true for all positive integers $n$.
   (a) $9^n - 1$ is divisible by 4
   (b) $1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$
   (c) $\frac{a^n}{n} = a^{n-1}$