Topics for Final Exam
Math 19, Fall 2012

General information. The final exam will be a timed test of 2 hours and 15 minutes (**WED MAY 15, 9:45am–noon**, in our usual room. You are allowed to use a calculator (but **not** a calculator that can do algebra, like the TI-89 or TI-92) and notes on **ONE** 3×5 note card (both sides). The final exam is **COMPREHENSIVE**, and will therefore involve both the topics on this sheet and **ALL PREVIOUS TOPICS**. There will be some emphasis on the new topics (6.5–6.6, 11.1–11.3), but everything we have covered is fair game.

Your first priority should be to understand the homework and quizzes and the ideas behind them. Besides the list of things you should know, below (and on the previous four review sheets), you should also be familiar with everything specially emphasized in the text. If time permits, try to do some of the problems that have answers in the back of the book.

Section 6.5–6.6. Solving non-right triangles: SAA, SSA use Law of Sines; SAS, SSS use Law of Cosines. (AAA is not enough information to solve.) Warning: $c^2 = a^2 + b^2$ does not work for non-right triangles.

Section 6.5. Law of Sines; applying Law of Sines to solve non-right triangles. SSA: When are there zero, one, or two solutions? Finding multiple solutions.

Section 6.6. Law of Cosines; applying Law of Cosines to solve non-right triangles.

Summary of solving triangles. In two tables:

Given	Solution
AAA	No solution: infinitely many triangles with same three angles
AAS = AAAS	Law of sines, $\dfrac{a}{\sin A} = \dfrac{b}{\sin B}$
SSA	Law of sines, $\dfrac{\sin A}{a} = \dfrac{\sin B}{b}$; see subchart
SAS	Law of Cosines, $c^2 = a^2 + b^2 - 2ab\cos C$, solve for c
SSS	Law of Cosines, $c^2 = a^2 + b^2 - 2ab\cos C$, solve for C

Subchart for SSA, given SSA a, b, A. If there are any solutions, $B_1 = \sin^{-1}\left(\dfrac{b \sin A}{a}\right)$ works. If $A \geq 90°$, only solution is B_1. If A is acute:

Name	Condition	Number of solutions
Short	$a < b\sin A$	No solutions
Equal	$a = b\sin A$	One solution, $B_1 = 90°$
Long	$b\sin A < a < b$	Two solutions, B_1 and $B_2 = 180° - B_1$
Very long	$a \geq b$	One solution B_1

11.1–11.3. Graphing $Ax^2 + Cy^2 + Dx + Ey + F = 0$. Cases:

Case	Standard form	Description of graph
$C=0,\ A\neq 0$	$y=a(x-h)^2+k$	Parabola, vertex (h,k)
$A=0,\ C\neq 0$	$x=a(y-k)^2+h$	Sideways parabola, vertex (h,k)
$A>0,\ C>0$; $A<0,\ C<0$ $(D=E=0)$	$\left(\frac{x}{a}\right)^2+\left(\frac{y}{b}\right)^2=1$	Ellipse, center $(0,0)$, x goes from $-a$ to $+a$, y goes from $-b$ to $+b$.
Otherwise: $(D=E=0)$	$\left(\frac{x}{a}\right)^2-\left(\frac{y}{b}\right)^2=1$	Hyperbola, center $(0,0)$, asymptotes $y=\pm\frac{b}{a}x$, vertices $(\pm a,0)$
Or: $(D=E=0)$	$-\left(\frac{x}{a}\right)^2+\left(\frac{y}{b}\right)^2=1$	Hyperbola, center $(0,0)$, asymptotes $y=\pm\frac{b}{a}x$, vertices $(0,\pm b)$

Not on exam. (11.1) Focus, directrix, focal diameter. (11.2) Foci (i.e., focuses), eccentricity. (11.3) Foci. (11.4) All — we didn't get to this in time.