Midterm 2 Review Sheet

Some thoughts on preparing for the exam: To study for the exam, doing lots of problems helps, but it matters how you do them. Be wary of being too dependent on the book for looking up equations or rules. Try to do exercises without looking things up in your book or notes. If you get stuck or don't know how to start, think about a problem for 5 minutes, and if you're still stuck, then look in the book. Then try a similar problem, and again, try to solve it without looking anything up. Keep doing this until you can do that type of problem without looking anything up. It is easy to do problems and then not remember anything about how to do them–the only way you really know if you can do a type of problem is by doing it correctly on your own without looking anything up. Try some problems from the review exercises at the end of each chapter as well-the benefit of this is that you won't know what section they're from so you'll have to figure out what rules/equations/concepts apply on your own. If you want to read something besides the book, see the Resources section of the course website–Paul's Online Math Notes or Purple Math may be helpful and have lots of examples.

Look at the practice test. A good idea is to try taking the practice test under exam conditions: time yourself and don't use any resources to see how you do. Feel free to email me with questions.

Note on calculators: You'll need a calculator to do the problems on solving triangles. On the exam, you will not need a calculator (and you will not be allowed to use one). Instead, if the problem requires knowledge of something like sin(22), I will provide that information.

Without further ado, here's a list of the topics we've covered and the most important things you need to know.

4.1 Exponential functions: Definition of exponential functions, their domain and range, graphing exponential functions, graphing families of exponential functions (vertical and horizontal translations, stretching/shrinking, etc.), solving exponential equations

4.2 Logarithms: Definition of logarithms, their domain and range, evaluating logarithmic functions, graphing logarithmic functions, solving logarithmic equations, solving exponential equations using logarithms

4.3 Rules of logarithms: inverse rules of logarithms, logarithm of a product, logaritm of a quotient, logarithm of a power, using these rules to simplify expressions and solve equations

4.4 More exponential and logarithmic equations: Solving various logarithmic equations, including those with more than one logarithm, solving exponential equations using logarithms, see strategy for solving exponential and logarithmic equations at the bottom of page 387

5.1 Angles and their measurements Definition of an angle, degree measure of an angle, radian measure of an angle, converting from degrees to radians and from radians to degrees, quadrants

5.2 The Sine and Cosine functions Definition of sine and cosine, evaluating sine and cosine at multiples of 90 degrees, multiples of 45 degrees, multiples of 30 degrees, using reference angles to evaluate sine and cosine in other quadrants, the Pythagorean identity (p. 428), using it to find cosine of an angle if you know sine of that angle and vice versa.

5.3 Graphing sine and cosine The graphs of sine and cosine, the definition of a periodic function, the periods of sine and cosine, definition of amplitude and phase shift, graphing families of trig functions (horizontal and vertical translations, stretching/shrinking/reflecting, changing the period

(e.g. $cos(3x)$, graphing combinations of these transformations)

5.4 The other trig functions: tan**,** cot**,** sec**,** csc The definitions of these functions in terms of sine and cosine, evaluating these functions, graphing $\tan(x)$, $\cot(x)$, $\sec(x)$, $\csc(x)$ by finding vertical asymptotes, zeros, and plotting points (to do this, you need to know all solutions to the equations $\cos(x) = 0$, $\sin(x) = 0$). The periods and fundamental cycles of these functions.

5.5 The inverse trig functions Definition of arcsin, arccos, arctan (first, review the definition of an inverse function in 2.5), their domains and ranges, evaluating the inverse trig functions, graphing the inverse trig functions, evaluating compositions of functions (see example 8), the inverse of a general sine or cosine functions (see example 9)

6.1 Basic trig identities The difference between a trig identity and a (conditional) trig equation, identities from the definitions, reciprocal identities (if you know the definitions of tangent, secant, etc., you can deduce these from the definitions), Pythagorean identities, odd and even identities, verifying that an equation is an identity

6.2 Verifying identities various tricks for verifying trig identities (see all of the examples in this section, e.g. factoring a trigonometric expression, combining fractions, etc.)

6.3 Sum and difference identities Sine and cosine of a sum or difference, cofunction identities, using the sum/difference identities to evaluate the trig functions at angles that are a sum of angles you know (e.g. 75=45+30, -15=30-45)

6.4 Double and half angle identities: The double angle identities, using them to find sine or cosine or tangent of twice of some angle, the half angle identities, using them to find sine or cosine or tangent of half of some angle (e.g. find $sin(22.5)$), using these equations to verify identities

6.5 Product identities Just make sure you are aware of the formulas.

6.6 Conditional trigonometric equations Finding all solutions to an equation of the form $\cos(x) = a$, $\sin(x) = a$, or $\tan(x) = a$–find all solutions in the fundamental cycle, then add k times the period of the function to get all of them), the number of solutions to $\sin(x) = a, \cos(x) = a, \tan(x) = a$ in the fundamental cycle (may depend on what a is)

7.1 Law of Sines Types of triangles (AAS, ASA, SSA, SAS, SSS), the law of sines, using the law of sines to solve AAS, ASA, and SSA triangles, figuring out how many triangles are possible in the SSA case and solving them

7.2 Law of Cosines The law of cosines, using it to solve SSS and SAS triangles, general procedure for solving triangles (see p. 569)