## GMS 91 REVIEW SHEET Dec 8, 2008

Here are the topics we have covered this semester.

- 1. Sets. Interval and set-builder notation, union, intersection, complement. Graphing intervals. Ch 1.
- 2. The concept of numbers, different types of numbers, natural numbers, integers, rational numbers, real numbers, complex numbers.
- 3. Arithmetic with natural numbers and integers. Binary operations (addition, subtraction, multiplication), commutativity (of addition and multiplication), associativity (of addition and multiplication), additive and multiplicative identity and inverse. You should be able to explain and fully justify these and give examples. Be able to justify things like 2 + 3 = 5, 5 (-9) = 4, -(-3) = 3, (-3)(-6) = 18, (-8)/(-4) = 2, (2 + 4) + 1 = 2 + (4 + 1), etc.
- 4. Factoring of integers, divisors, multiples. Greatest common divisor and least common multiple. Prime factorization. You should know how to find the gcd and the lcm using prime factorization and be able to explain why it can be done that way.
- 5. Arithmetic with rational numbers. Binary operations (addition, subtraction, multiplication, division), commutativity (of addition and multiplication), associativity (of addition and multiplication), additive and multiplicative identity and inverse, distributivity of multiplication over addition. You should be able to explain and fully justify these and give examples. Be able to justify things like

$$\frac{9}{6} = \frac{3}{2}, \frac{-5}{-8} = \frac{5}{8}, \frac{2}{7} + \frac{4}{3} = \frac{34}{21}, \frac{2}{7}\frac{4}{3} = \frac{8}{21}, \frac{\frac{2}{7}}{\frac{4}{3}} = \frac{2}{7}\frac{3}{4} = \frac{3}{14},$$
$$\frac{p}{q} + \frac{m}{n} = \frac{np + mq}{nq}, \left(\frac{m}{n} + \frac{p}{q}\right) + \frac{r}{s} = \frac{m}{n} + \left(\frac{p}{q} + \frac{r}{s}\right).$$

Ch 1.2.

- 6. Arithmetic with real numbers. The number line, absolute value, geometric interpretation of additional, subtraction, absolute value, <, >, ≤, ≥. Binary operations (addition, subtraction, multiplication, division), commutativity (of addition and multiplication), associativity (of addition and multiplication), additive and multiplicative identity and inverse, distributivity of multiplication over addition. You should be able to give examples of these. Ch 1.
- 7. Arithmetic with complex numbers. Binary operations (addition, subtraction, multiplication, division), commutativity (of addition and multiplication), associativity (of addition and multiplication), associativity of addition and multiplication), additive and multiplicative identity and inverse, distributivity of multiplication over addition. The complex plane, absolute value, real and imaginary parts, conjugation. You should be able to explain and fully justify these and give examples. Be able to justify things like  $|z| = \sqrt{z\overline{z}}, \ \overline{w} + \overline{z} = \overline{w+z}, \ \overline{w} \ \overline{z} = \overline{w\overline{z}}, \ \overline{(\overline{z})} = z, \ |w||z| = |wz|, \ \overline{(\frac{w}{z})} = \frac{\overline{w}}{\overline{z}}$ . Ch 8.6.
- 8. Linear equations and inequalities. Identities, conditional equations. Absolute value and fractions in equations and inequalities. Solving equations and inequalities, splitting into cases, finding sets of solutions, graphing solutions on the number line. Word problems, percentages. Ch 2 and 5.5.
- 9. Polynomials. Powers and exponents. Total degree and degree in a variable. Adding, subtraction, multiplying, and dividing polynomials. Long-hand multiplication and division of

polynomials. Quotient, remainder. Properties of degree with respect to multiplication. Factoring polynomials. Completing the square and the quadratic formula. Ch 4, but see also Ch 9.1 and 9.2 for the quadratic formula.

- 10. Rational expressions. Adding, subtracting, multiplying, and dividing rational expressions. Common denominator, simplifying and expanding fractions. Equations and inequalities with fractions. Word problems and ratios. Ch 5.
- 11. Functions. What is a function? Domain and range. Graphs of equations. The vertical line test. Ch 6.1-2.