Math 105.04 Fall 2003
Basic Algebra Review

The following is a sample of problems from high school algebra. They represent the basic algebra skills that you are assumed to know from your high school algebra classes and will be expected to use in this course.

1. Determine whether each of the following statements is true or false.

T F	$3(x - 17) = 3x - 17$	T F $\quad (x - 5) = -(5 - x)$
T F	$\left(\dfrac{a}{b}\right)^2 = \dfrac{a^2}{b^2}$	T F $\quad \dfrac{1}{a} + \dfrac{1}{b} = \dfrac{a + b}{ab}$
T F	$\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$	T F $\quad \dfrac{\frac{a}{b}}{c} = \dfrac{a}{bc}$
T F	$\dfrac{a + b}{c} = \dfrac{a}{c} + \dfrac{b}{c}$	T F $\quad \dfrac{a}{\frac{b}{c}} = \dfrac{ac}{b}$
T F	$\dfrac{a}{b + c} = \dfrac{a}{b} + \dfrac{a}{c}$	T F $\quad \sqrt{3x} = 9\sqrt{x}$
T F	$\sqrt{4x} = 2\sqrt{x}$	T F $\quad \sqrt{x^2 + 4} = x + 2$
T F	$x^a x^b = x^{ab}$	T F $\quad (x + 3)^2 = x^2 + 9$
T F	$x^a x^b = x^{a+b}$	T F $\quad \dfrac{\frac{a}{b}}{\frac{c}{d}} = \dfrac{a}{c} \cdot \dfrac{b}{d}$
T F	$x^2 - 9 = (x + 3)(x - 3)$	T F $\quad \dfrac{a}{c} + \dfrac{b}{d} = \dfrac{a + b}{c + d}$
T F	$(x - 2)^3 = x^3 - 6x^2 + 12x - 8$	T F $\quad 3.07 \times 10^4 = 30,700$
T F	$|x + y| = |x| + |y|$	T F $\quad 3.07 \times 10^{-4} = .000307$
T F	$|xy| = |x| \cdot |y|$	T F $\quad 3^0 = 0$
T F	$2^{3x} = 6^x$	T F $\quad \dfrac{a^{-p}}{b^{-q}} = \dfrac{b^q}{a^p}$

2. Compute the value of $\dfrac{\sqrt{6}\sqrt{2}}{\sqrt{3}}$ exactly.

3. Factor the polynomial $9x^2 - 1$.

4. Factor the polynomial $x^2 - 7x + 6$.

5. Completely factor the polynomial $x^4 - 7x^2 + 6$.

6. Completely factor the polynomial $x^3 + 2x^2 + 3x + 6$.

7. Simplify $5^{(1-2x)}(5^x)^2$ as much as possible.

8. Simplify $\dfrac{2m}{m^2 + 3m + 2} - \dfrac{2}{m+2}$ as much as possible.

9. Simplify $\dfrac{\sqrt[3]{27x^5y^{12}}}{\sqrt[4]{x^3}}$ so that x and y each occur only once.

10. Simplify $\dfrac{2}{m+2} - \dfrac{2}{m-2}$ as much as possible.

11. Simplify $\dfrac{a^2b^3a^{-3}}{b^{-2}}$ so that a and b each occur only once.

12. Find the solution set of the equation $x^4 - 7x^2 = -6$.

13. Find the solution set of the inequality $2x - 7 \leq 13 - 3x$.

14. Find the solution set of the inequality $|x - 1| \leq 6$.

15. Find the solution set of the equation $\sqrt{x + 11} + x = 1$.

16. Find the solution set of the equation $3x + 2 \leq 20 + 4x$.

17.   Find the solution set of the equation $|2x - 1| \leq 6$.

18.   Find $\log_2(12) - \log_2(3)$.

19.   Solve the equation $\log_a(3) = \dfrac{1}{3}$ for a.

20.   Solve the following system for x and y.
$$\begin{cases} x & + & y & = & -2 \\ y & - & 3x & = & -6 \end{cases}$$

21.   Solve the following system for x and y.
$$\begin{cases} 3x & - & 2y & = & 0 \\ y & - & 2x & = & -1 \end{cases}$$

Basic Algebra Review (Answers)

1. From top to bottom in the first column: F, T, T, T, F, T, F, T, T, T, F, T, F, and from top to bottom in the second column: T, T, T, T, F, F, F, F, F, T, T, F, T.

2. 2

3. $(3x + 1)(3x - 1)$

4. $(x - 6)(x - 1)$

5. $(x^2 - 6)(x^2 - 1) = (x - \sqrt{6})(x + \sqrt{6})(x - 1)(x + 1)$

6. $(x^2 + 3)(x + 2)$

7. 5

8. $\dfrac{-2}{(m + 2)(m + 1)}$

9. $3y^4 x^{\frac{11}{12}}$

10. $\dfrac{-8}{m^2 - 4}$

11. $\dfrac{b^5}{a}$

12. $x = \pm\sqrt{6}$ or $x = \pm 1$

13. $x \leq 4$

14. $-5 \leq x \leq 7$

15. $x = -2$ (Note that $x = 5$ is not a solution.)

16. $x \geq -18$

17. $\dfrac{-5}{2} \leq x \leq \dfrac{7}{2}$

18. 2

19. $a = 27$

20. $x = 1, y = -3$

21. $x = 2, y = 3$