Tentative review – this will get you started – I need to look over the material Friday and Saturday to make sure I have not forgotten anything else. Check back then and see if anything else has been added.

Begins with polynomials – you were tested on but the ideas are needed when working with algebraic fractions.

Polynomials and algebraic fractions: factoring, degree, division, products, sum and difference

Solving linear equations, solving quadratic equations, complex numbers

1. State the quadratic formula.

2. List the four methods we used to solve a quadratic equation

3. Which of these is quadratic and which is linear?

\[ x^2 = 1 + x(x + 1) \quad x = 1 - x \quad x^2 = 5x \]

4. Which of these are polynomials and which are not?

\[ 3 \quad 1 - x \quad 3x - xy + \frac{1}{2} y^3 \quad 2 - x^{\frac{1}{2}} + y^3 \quad \frac{x + 2y}{x - 2y} \]

4. What is the degree of each of the following polynomials

\[ x^3 y^4 + 2^{10} \rightarrow \quad 1 + x^3 + 4x^2 \rightarrow \]

\[ x + 2y \]
*** You will not see as many of the following problems (5 and 6) on the second exam – but you will see a few.

5. Perform the given operation and simplify – do not factor your final solution

   a) \((x - 2y)^2 = \) ________________

   b) \((x^3 + x - y) - x(x^2 + 1 - y) = \) ________________

   c) \((x - 4y)(x + 4y) = \) ________________

   d) \((x^2 - 4x + 3) \div (x - 1) = \) ________________

6. Factor each of the following polynomials.

   a) \(x + 4xy = \) ________________

   b) \(x^2 - 9y^2 = \) ________________

   c) \(x^4 - xy^3 = \) ________________

   d) \(16 - x^4 = \) ________________

   e) \(3x^2 + 7x + 4 = \) ________________

   f) \(xy - y + x^2 - 1 = \) ________________

   g) \(x^2 + 5x - 36 = \) ________________

   h) \(x^6 - 64 = \) ________________
7. Simplify the following algebraic fractions

a) \( \frac{x^3 - y^3}{x^2 - y^2} = \) _____________

b) \( \frac{3 - xy}{xy - 3} = \) _____________

8. Simplify by performing the given operation and reducing to lowest terms.

a) \( \frac{3 - x}{x - 2} - \frac{x - 1}{x - 2} = \) _____________

b) \( \frac{x^2 - 4x}{x^2 - 16} + \frac{3x^2 + 3x}{x^2 + 5x + 4} = \) _____________

c) \( \frac{x^2 - 4x - 12}{x^2 - 12x + 36} + \frac{x^2 - 4}{x^2 - 5x - 6} = \) _____________

d) \( \frac{4 - x}{2 - x} + \frac{2}{x - 2} = \) _____________
9. Write the following quadratic equation in standard form.
\[ x^2 = 1 - 2x \] 
find the values of a, b, and c. \[ \rightarrow \] 
____________________________

10. Write the four basic forms of \( i^n \). 

Simplify.
\[ i^{17} = \] 
\[ i^{400} = \] 
____________________________

11. Perform the given operation

\[ (2 - 3i)(4 + 2i) = \] 
\[ 1 - 3i - (4 + 2i) = \] 

\[ \frac{1 - 2i}{1 + i} = \] 
if \( (a + bi)^{10} = 1 - i \), then \( (a + bi)^{20} = ? \) 
____________________________

12. Find the conjugate of

\[ 4 - \frac{1}{2}i \] 
\[ -2i \] 
\[ 4 + 0i \]
13. find the modulus

\[ \frac{4i}{4 - 3i} \]

14. what is the imaginary part of

\[ 3i \quad - 1 - 3i \]

What is the real part of each?

15. graph \( 2 - 3i \)

16. Find the discriminant of

\[ x^2 - 4x + 9 = 0 \]

What can you say about the roots of \( ax^2 + bx + c = 0 \) if its discriminant is equal to (circle all that apply):

1) \(-9\) → real or imaginary, rational or irrational or neither, equal or unequal
2) \(0\) → real or imaginary, rational or irrational or neither, equal or unequal
3) \(49\) → real or imaginary, rational or irrational or neither, equal or unequal
4) \(2\) → real or imaginary, rational or irrational or neither, equal or unequal

17. Find the solution of each of the following equations

a) \( x^2 = 4x \)

\[ 1 - 2x = x^2 \]

b) \[ \frac{2x}{1 - x} = \frac{x}{1 + x} \]

c) \( x^2 - 4x - 2 = 0 \)
18. Almost quadratic

\[ x^4 - 3x^2 - 4 = 0 \quad \text{and} \quad x - 2x^4 - 1 = 0 \]

19. with radicals

\[
\sqrt{1 - x} = 1 \quad \sqrt{x} = -2 \quad 2 \cdot \sqrt{x} = x \quad \text{plus the one I mentioned in class}
\]

More complex examples: ______________

20. Inequalities

\[
1 - 2x > x \quad \text{and} \quad x + 1 > x + 2
\]

\[
2 < 1 - x < 4
\]

***** We have not covered this material ******* it may not be on exam ** unless we get to it before the exam***

20. More inequalities

\[
x^2 - 2x \geq 0 \quad \text{and} \quad x^2 + x - 2 < 0
\]

\[
\frac{x}{x + 1} > 0 \quad \text{and} \quad \frac{x + 2}{x - 3} \leq 0
\]

\[x(x + 1)(x - 3) > 0\]
23. Find the solution of the following equation by completing the square.

\[ x^2 + 5x - 6 = 0 \quad \text{and} \quad 2x^2 + x - 4 = 0 \]

21. Word problems as seen in class (or in Homework)