MATH 127 Review Sheet for Exam 1

1. Section 1.2 Exponents and Radicals.

   (a) Simplify the following expressions.

      i. $\left(\frac{1}{2}x^3\right)(8x^2)$
      ii. $\left(\frac{x^2y^{-4}}{xy^3}\right)$
      iii. $(3y^3z^2)(2y^{-5}zw^0)$
      iv. $(2y)^3(5y)^2$
      v. $\left(\frac{3x^3y^{-2}z}{15x^{-5}y^4z^3}\right)^2$
      vi. $\sqrt{2x^3y^4}$
      vii. $\sqrt[3]{24x^4y^6z^{11}}$
      viii. $\frac{\sqrt{50x^7y^{11}}}{\sqrt{2x^3y^5}}$
      ix. $(3\sqrt[4]{4xyz})(2\sqrt[4]{4x^3y^4z^0})$

   (b) Write the expression using rational exponents.

      i. $\sqrt[4]{x^3}$
      ii. $\sqrt[5]{y^2}$
      iii. $\sqrt{(a+b)^5}$

   (c) Write the following using radicals.

      i. $x^{3/2}$
      ii. $y^{5/3}$
      iii. $(4+x)^{7/3}$

2. Section 1.3 Algebraic Expressions

   (a) Perform the following Operation.

      i. $(2x^2-3x+4)+(x^3+4x^2-1)$
      ii. $(3x^5+x^4-2x^2+x)+(8x^3-12x^2+4x-7)$
      iii. $(2x^4-x^2+44)-(6x^2-3x+2)$
      iv. $(23x^7+9x^4-x^3+22x)-(6x^8-x^7+2x^5+13x^4-x^2+x-9)$
      v. $(x-3)(x+4)$
      vi. $(2x+1)(x-7)$
      vii. $(x+4)(2x^2+3x-1)$
      viii. $(x^2-1)(x^2+1)$
      ix. $(2x^4-4x^3+8x^2+14x)\div(2x)$
      x. $(25x^4-15x^3+100x^2)\div(5x^2)$

(b) Factor the following polynomials Completely.

i. $x^2 - 6x - 27$

ii. $x^2 + 9x - 22$

iii. $3x^4 - 30x^3 + 63x^2$

iv. $2x^2 + 15x + 7$

v. $9x^2 + 9x + 2$

vi. $2x^2 + 3x - 9$

vii. $12x^2 + 14x - 10$

viii. $5x^3 - 6x^2 - 8$

ix. $x^3 - 8$

x. $9x^2 - 4$

xi. $x^2 - 16$

xii. $x^4 - 16$

xiii. $8x^3 + 27$

3. Section 1.4 Fractional Expressions

(a) Simplify

i. $\frac{2x^2+7x+3}{2x^2-7x-4}$

ii. $\frac{y^2-9}{y^3+27}$

iii. $\frac{9x^2-4}{3x^2-5x+2}$

(b) Perform the indicated operation.

i. $\frac{x^2-1}{8x-56} \cdot \frac{4x-28}{3x+3}$

ii. $\frac{x^2+8x-20}{xy-6y^2} \div \frac{x^2-100y^2}{x^2-16xy+60y^2}$

iii. $\frac{5x-35}{x^3+16x} \cdot \frac{2x^3+14x^2}{x^2-49}$

iv. $\frac{2x^2-5x-12}{4-x} \div \frac{4x^2-9}{16-x^2}$

v. $\frac{3x}{x^2-4} + \frac{x-2}{x^2-4}$

vi. $\frac{x-3}{x+3} - \frac{x}{x-3}$

vii. $\frac{2x+5}{x-2} + \frac{5}{x^2+3x-10}$

viii. $\frac{2x+3}{x^2+5x+6} - \frac{x-2}{x+3}$

(c) Simplify

i. $\frac{\frac{1}{x+2}-3}{\frac{4}{x}-x}$

ii. $\frac{\frac{1}{x-1}-\frac{1}{x+1}}{\frac{1}{x^2-1}}$

iii. $\frac{\frac{x}{x-3}+\frac{3}{x+2}}{x^2-x-6}$

(d) Rationalize the denominator.

i. $\frac{3}{\sqrt{5}}$

ii. $\frac{2}{2-\sqrt{3}}$

iii. $\frac{1+\sqrt{7}}{1-\sqrt{7}}$

iv. $\frac{2-3\sqrt{2}}{1+\sqrt{2}}$

4. Section 2.1 Equations

(a) Solve the following equations.

i. $3(x-5) = 2(x+4)$

ii. $\frac{3}{5}(x+3) - 4 = \frac{x}{15}$

iii. $(x-2)(x+1) = (x+7)(x-3)$

iv. $\frac{3}{x+5} - \frac{x}{x-3} = \frac{7x-x^2}{x^2+2x-15}$

v. $\frac{2-x}{x^2+2x-8} + \frac{3}{x+4} = \frac{1}{x-2}$

vi. $\frac{x}{x-4} + \frac{3}{2x+3} = \frac{2x^2+12x-3}{2x^2-5x-12}$

5. Section 2.2 Applied Problems

(a) Solve the following problems.

i. A benefit concert for charity was held in the ballroom of a hotel. There were two ways to contribute the charity. Tables in the front of the ballroom could be bought for \$2000 each. Individual tickets could be bought for \$150 each. A total of 270 tables and individual tickets were bought. The amount raised for charity was \$66,400. How many people bought tables?

ii. A store had a promotion on their first day of business to draw in customers. Each customer could choose between a free compilation CD of pop music or a free DVD containing short animated films. The store bought the CDs and the DVDs from a large distribution company for \$1.85 and \$2.15, respectively. At the end of the day, the store calculated that it had spent a total of \$473.25 on the free merchandise. If a total of 243 people received a free CD or DVD, how many DVDs did the store give away?

iii. Harrison and his brother Kelvin are running to the ice cream store. Kelvin can run 8 miles per hour and Harrison can run 5 miles per hour. Kelvin agrees to give his brother a 15 minute head start. How long does it take Kelvin to catch his brother? If the ice cream store is 3.5 miles away, will Kelvin beat his brother to the store?

iv. Bert's car gets 22 mi/gallon city and 39 mi/gallon freeway. This week Bert used 28 gallons of gas and drove 922 miles. How many gallons did Bert use on the freeway?

v. A chemist wants to create a 100 mL mixture that is 25% salt from a saline solution that is 35% salt and another solution that is 10% salt. How much of the first mixture must she use?

vi. Martha walks or runs 30 miles a week. She runs 6 miles per hour and walks 4 miles per hour. If she spent 5.5 hours running or walking this week, how many miles did she run?

6. Section 2.3 Quadratic Equations

   (a) Solve by Factoring.

      i. $3x^2 + 13x + 14 = 0$
      ii. $15x^2 - 3x = 8x - 2$
      iii. $x(x^2 - 2) = 14x$
      iv. $8(x^2 - x) + 3x = 17(x + 1) - 11$
      v. $\frac{(2x-5)(2x+5)}{3} = 5x$

   (b) Solve by Completing the Square

      i. $x^2 + 6x = 5$
      ii. $x^2 - 10x + 22 = 0$
      iii. $x^2 + 5x - 1 = 0$
      iv. $x^2 - \frac{2}{3}x + 4 = 0$
      v. $x^2 - 5 = 3x$
      vi. $x^2 + 5x + 1 = 0$
      vii. $x^2 - 10x + 29 = 0$

   (c) Solve using the Quadratic Formula.

      i. $2x^2 + 5x = 8$
      ii. $9x^2 + 25 = 30x$
      iii. $4x^2 = 6x + 5$
      iv. $3x^2 + 10x + 4 = 2x + 3$
      v. $2x^2 - 7x + 11 = 0$
      vi. $7x^2 + 2 = x$
      vii. $x^2 - 12x + 61 = 0$

7. Section 2.4

   (a) Perfrom the following operations.

      i. $(2 - 3i) + (4 + i)$
      ii. $(2 - \sqrt{-25}) + (1 + \sqrt{-4})$
      iii. $4i - (6 - 3i)$
      iv. $(1 + 2i)(3 - i)$

v. $(\sqrt{-81})(3-\sqrt{-17})$
vi. $(5-4i)(5+4i)$
vii. $\frac{2-3i}{i}$
viii. $\frac{1-\sqrt{-12}}{2+\sqrt{-20}}$
ix. $\frac{1+i}{1-i}$
x. $\frac{5+2i}{2-3i}$

8. Section 2.5 Other Types of Equations

   (a) Solve

      i. $|2x+3| = 9$
      ii. $2|x-5| + 2 = 14$
      iii. $|3x-1| - 2 = 17$
      iv. $\sqrt{2x+3} = x$
      v. $2 + \sqrt{x-2} = x$
      vi. $\sqrt{2x+5} = x+3$
      vii. $x = 4 + \sqrt{12x-84}$

9. Section 2.6/2.7 Inequalities

   (a) Express the following inequalities in interval notation.

      i. $3 \geq x$
      ii. $-3 \leq x \leq 10$
      iii. $x \leq 0$
      iv. $3/2 \geq x \geq -2/5$

   (b) Solve the following inequalities and leave your answers in interval notation.

      i. $3x - 2 \leq 4(x-6)$
      ii. $-3 \leq 3 - 2x \leq 14$
      iii. $\frac{-2}{5}(x-5) \geq \frac{3}{5}x + 3$
      iv. $12 \geq 5 - 3x \geq 3$
      v. $(x+2)(x-3) \geq 0$
      vi. $x^2 - 3x \geq -2$
      vii. $\frac{2x-3}{x+5} \geq 0$
      viii. $\frac{x+3}{x-3} \geq 4$
      ix. $\frac{(2x+1)(3-5x)}{x-7} \leq 0$
      x. $\frac{1-3x}{(x+2)(x-6)} \geq 0$