MATH 127 Review Sheet for Exam 1 (Answers)

1. Section 1.2 Exponents and Radicals.

   (a) Simplify the following expressions.

      i. $4x^5$
      ii. $\frac{x}{y^7}$
      iii. $6y^8z^3$
      iv. $200y^5$
      v. $\frac{x^{16}}{25y^{12}z^4}$
      vi. $xy^2\sqrt{2x}$
      vii. $2xy^2z^3\sqrt[3]{2xz^2}$
      viii. $5x^2y^6$
      ix. $12xy\sqrt[4]{yz}$

   (b) Write the expression using rational exponents.

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

   (c) Write the following using radicals.

      i. $\sqrt{x^3}$
      ii. $\sqrt[3]{y^5}$
      iii. $\sqrt[3]{(4+x)^7}$

2. Section 1.3 Algebraic Expressions

   (a) Perform the following Operation.

      i. x^3+6x^2-3x+3
      ii. $3x^5+x^4+8x^3-14x^2+5x-7$
      iii. $2x^4-7x^2+3x+42$
      iv. $-6x^8+24x^7-2x^5-4x^4-x^3+x^2+21x+9$
      v. x^2+x-12
      vi. $2x^2-13x-7$
      vii. $2x^3+11x^2+11x-4$
      viii. x^4-1
      ix. x^3-2x^2+4x+7
      x. $5x^2-3x^3+20x$

(b) Factor the following polynomials Completely.

i. $(x-9)(x+3)$

ii. $(x+11)(x-2)$

iii. $3x^2(x-1)(x-9)$

iv. $(2x+1)(x+7)$

v. $(3x+2)(3x+1)$

vi. $(2x-3)(x+3)$

vii. $2(2x-1)(3x+5)$

viii. $x(5x+4)(x-2)$

ix. $(x-2)(x^2+2x+4)$

x. $(3x-2)(3x+2)$

xi. $(x-4)(x+4)$

xii. $(x^2+4)(x-2)(x+2)$

xiii. $(2x+3)(4x^2-6x+9)$

3. Section 1.4 Fractional Expressions

(a) Simplify

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

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

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

(b) Perform the indicated operation.

i. $\frac{(x-1)}{6}$

ii. $\frac{(x+10)(x-2)}{y(x+10y)}$

iii. $\frac{10x}{(x^2+16)}$

iv. $\frac{(x-4)(x+4)}{2x-3}$

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

vi. $\frac{-9x+9}{(x+3)(x-3)}$

vii. $\frac{2x^2+15x+30}{(x-2)(x+5)}$

viii. $\frac{-x^2+2x+7}{(x+2)(x+3)}$

(c) Simplify

i. $\frac{x(3x+5)}{(x-4)(x+2)}$

ii. 2

iii. $\frac{x^2+5x-3}{(x-3)^2(x+2)^2}$

(d) Rationalize the denominator.

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

ii. $4 + 2\sqrt{3}$

iii. $\frac{4+\sqrt{7}}{-3}$

iv. $-8 + 5\sqrt{2}$

4. Section 2.1 Equations

   (a) Solve the following equations.

      i. $x = 19$

      ii. $x = \frac{33}{8}$

      iii. TYPO!$(x - 2)(x + 1) = (x + 7)(x - 3)$ gives $x = \frac{19}{3}$.

      iv. $x = -1$ This checks!

      v. $x = 8$ This checks!

      vi. $x = \frac{-1}{6}$

5. Section 2.2 Applied Problems

   (a) Solve the following problems.

      i. Let t be the number of tables purchased. Then there were $270-t$ individual tickets purchased. Your equation is as follows.

      $$2000t + 150(270 - t) = 66400$$

      This gives $t = 14$ as a solution. Fourteen people bought tables.

      ii. Let d be the number of DVDs given away. Then there were $243 - d$ CDs given away. Your equation should be

      $$2.15d + 1.85(243 - d) = 473.25$$

      This gives $d = 79$ as a solution. Thus, 79 DVDs were given away.

      iii. Let k be the amount of time in hours that Kelvin runs before catching Harrison. Harrison must run for $k + 1/4$ hours. Kelvin has run $8k$ miles and Harrison has run $5(k + 1/4)$ miles. We want these to be the same distance, so the equation we get is

      $$8k = 5(k + 1/4)$$

      This gives $k = \frac{5}{12}$ as solution. It takes Kelvin 25 minutes to catch his brother. In $5/12$ hours Kelven goes $8 \times 5/12$ miles, which is about 3.3 miles, so he will beat Harrison to the ice cream store.

      iv. Let g be the number of gallons used on the highway. Then Bert used $28-g$ gallons in the city. This gives us the following equation

      $$39g + 22(28 - g) = 922$$

      This gives us $g = 18$ as a solution. Bert used 18 gallons of gas on the freeway.

v. Use a chart.

	Amount	Concentration
Saline	x	.35
Other	$100 - x$	.1
Mixture	100	.25

Multiplying across gives equation.

$$.35x + .1(100 - x) = 25$$

This gives $x = 60$. She must use 60 mL of the saline solution.

vi. Let r be the amount of time spent running. Then she walked for $5.5 - r$ hours. This gives equation

$$6r + 4(5.5 - r) = 30$$

This gives solution $r = 4$. Note, this is the amount of time spent running. We want to know how many miles she ran. She ran for 4 hours, which amounts to 24 miles.

6. Section 2.3 Quadratic Equations

(a) Solve by Factoring.

i. $x = -2$ or $-7/3$

ii. $x = 2/5$ or $1/3$

iii. $x = 0, 4$ or -4

iv. $x = -1/4$ or 3

v. $x = 5$ or $-5/4$

(b) Solve by Completing the Square

i. $x = -3 \pm \sqrt{14}$

ii. $x = 5 \pm \sqrt{3}$

iii. $x = \frac{-5 \pm \sqrt{29}}{2}$

iv. $x = \frac{1 \pm i\sqrt{35}}{3}$

v. $x = \frac{-3 \pm \sqrt{29}}{2}$

vi. $x = \frac{-5 \pm \sqrt{21}}{2}$

vii. $x = 5 \pm 2i$

(c) Solve using the Quadratic Formula.

i. $\frac{-5 \pm \sqrt{89}}{4}$

ii. $\frac{-5}{3}$

iii. $\frac{3 \pm \sqrt{29}}{4}$

iv. $\frac{-2 \pm \sqrt{13}}{3}$

v. $\frac{7 \pm i\sqrt{39}}{4}$

vi. $\frac{1 \pm i\sqrt{55}}{14}$

vii. $6 \pm 5i$

7. Section 2.4

   (a) Perfrom the following operations.

      i. $6 - 2i$
      ii. $3 - 3i$
      iii. $-6 + 7i$
      iv. $5 + 5i$
      v. $9\sqrt{17} + 27i$
      vi. 41
      vii. $-3 - 2i$
      viii. $\frac{1-2\sqrt{15}-i\sqrt{5}-2i\sqrt{3}}{12}$
      ix. i
      x. $\frac{4+19i}{13}$

8. Section 2.5 Other Types of Equations

   (a) Solve

      i. $x = 3$ or -6
      ii. $x = 11$ or $x = -1$
      iii. $x = 20/3$ or -6
      iv. Possible solutions $x = 3, -1$. $x = -1$ doesn't work. Solution: $x = 3$ only.
      v. Possible solutions $x = 2, 3$. They both check.
      vi. TYPO! Should be $\sqrt{2x + 5} = x + 3$. Possible solution $x = -2$. It checks.
      vii. Possible solutions $x = 10$. It checks.

9. Section 2.6/2.7 Inequalities

   (a) Express the following inequalities in interval notation.

      i. $(-\infty, 3]$
      ii. $[-3, 10]$
      iii. $(-\infty, 0]$
      iv. $[-2/5, 3/2]$

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

      i. $[22, \infty)$
      ii. $[-11/2, 3]$
      iii. $(-\infty, -1]$
      iv. $[-7/2, 2/3]$
      v. $(-\infty, 2]$ or $[3, \infty)$

vi. $(-\infty, 1]$ or $[2, \infty)$

vii. $(-\infty, -5)$ or $[3/2, \infty)$

viii. $(3, -5]$

ix. TYPO! $\frac{(2x+1)(3-5x)}{x-7} \leq 0$ Solution: $[-1/2, 3/5]$ or $(7, \infty)$

x. TYPO! $\frac{1-3x}{(x+2)(x-6)} \geq 0$ Solution: $(-\infty, 2)$ or $[1/3, 6)$