

Exam 3 - Study Guide - Key

The following topics from Chapters 1.3.3 - 2.2.1 will be covered on Friday's exam. The bullet points here are based on the titles of the sections from the course text (and the titles of the course slides).

- Rational Expressions
 - Adding and Subtracting Rational Expressions (Chapter 1.3.3)
 - Complex Rational Expressions (Complex Fractions) (Chapter 1.3.4)
- Radical Expressions
 - Simplifying Radical Expressions (Chapter 1.4.1 - 1.4.2)
 - Rational Exponents (Chapter 1.4.3)
 - Adding, Subtracting and Multiplying Radical Expressions (Chapter 1.4.4)
 - Dividing Radical Expressions (Chapter 1.4.5)
 - Complex Numbers (Chapter 1.4.6)
- Solving Linear Equations (Chapter 2.1)
- Solving Quadratic Equations
 - Solving Quadratic Equations Using the Zero-Product Property (Chapter 2.2.1)

NOTE: We learned that $\sqrt{-1} = i$ so we will no longer write “DNE” and/or “not real” when we have the square root of a negative number. Be careful!

Exam 3 will include the following types of problems.

1. Three problems simplifying rational expressions

- (a) $\frac{9x+14}{x+7} + \frac{x^2}{x+7} \quad x+2$
- (b) $\frac{x-4}{x} + \frac{4}{x^2} \frac{(x-2)(x-2)}{x^2} \quad \text{OR} \quad \frac{(x-2)^2}{x^2}$
- (c) $\frac{4}{m+3} + \frac{3}{m+4} \frac{7m+25}{(m+3)(m+4)}$
- (d) $\frac{8y}{y^2-16} - \frac{4}{y-4} \frac{4}{y+4}$
- (e) $\frac{\frac{1}{x^2-7x+12}}{\frac{2}{x-4}} \frac{1}{2(x-3)}$
- (f) $\frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{a^2} - \frac{1}{b^2}} \frac{ab}{b-a}$

2. Eight problems simplifying radical expressions

Simplify completely. Use absolute values and standard form $(a + bi)$ when appropriate. DO NOT list “DNE” or “not real” as an answer. Denominators of rational expressions should not contain radical signs nor imaginary numbers.

- (a) $\sqrt{225}$ 15
- (b) $\sqrt{-225}$ $15i$
- (c) $\sqrt{16x^2y^6z^{10}}$ $4|xy^3z^5|$
- (d) $\sqrt{\frac{24p^3}{49}}$ $\frac{2p\sqrt{6p}}{7}$
- (e) $\frac{\sqrt{48a^7}}{\sqrt{3a}}$ $4|a^3|$
- (f) $32^{\frac{1}{5}}$ 2
- (g) $\sqrt[3]{64}$ 4
- (h) $-25^{\frac{3}{2}}$ -125
- (i) $-25^{-\frac{3}{2}}$ $-\frac{1}{125}$
- (j) $x^{\frac{3}{4}} \cdot x^{\frac{5}{8}}$ $x^{\frac{11}{8}}$ OR $(\sqrt[8]{x})^{11}$ OR $\sqrt[8]{x^{11}}$
- (k) $(x^9)^{\frac{2}{9}}$ x^2
- (l) $\frac{a^{\frac{1}{6}}}{a^{\frac{5}{6}}}$ $\frac{1}{a}$
- (m) $\sqrt{20} - 3\sqrt{5}$ $-\sqrt{5}$
- (n) $\sqrt{6}(1 + 3\sqrt{6})$ $18 + \sqrt{6}$
- (o) $(2 - 3\sqrt{11})(4 - \sqrt{11})$ $41 - 12\sqrt{11}$
- (p) $\frac{4}{\sqrt{3}}$ $\frac{4\sqrt{3}}{3}$
- (q) $\frac{2}{4-\sqrt{6}}$ $\frac{4+\sqrt{6}}{5}$
- (r) $(2 + 3i) + (7 - 5i)$ $9 - 2i$
- (s) $4i(5 - 3i)$ $12 + 20i$
- (t) $(3 - \sqrt{-12})(5 + \sqrt{-27})$ $33 - \sqrt{3}i$
- (u) $\frac{3+3i}{2i}$ $\frac{3}{2} - \frac{3}{2}i$
- (v) $\frac{1+6i}{6-i}$ i

3. Four problems solving linear and quadratic equations.

- (a) $8x + 10 = 4x + 2$ $x = -2$
- (b) $3(2 + x) - 9 = 0$ $x = 1$
- (c) $\frac{2}{3}x + 6 = 2$ $x = -6$
- (d) $\frac{x+1}{4} + \frac{5x}{12} = \frac{5}{6}$ $x = \frac{7}{8}$
- (e) $(2m + 1)(m + 3) = 12m$ $m = 1, m = \frac{3}{2}$
- (f) $(3x - 4)(4x - 3) = 0$ $x = \frac{3}{4}, x = \frac{4}{3}$
- (g) $9x^2 = 121$ $x = -\frac{11}{3}, x = \frac{11}{3}$
- (h) $u^2 - 5u - 14 = 0$ $x = -2, x = 7$
- (i) $2x^2 + 30x = -100$ $x = -5, x = -10$

4. One problem identifying whether or not an equation is linear (or quadratic)

(a) Is the following equation a linear equation?

- $2y^2 + 4 = 2y^2 + 5x - 2$ **Yes**
- $5y + 2y + 6 = 7y + 8$ **No**
- $2y - 2 = 4 + 6y$ **Yes**

(b) Is the following equation a quadratic equation?

- $3c^2 = 10c - 8$ **Yes**
- $25q^2 = 16$ **Yes**
- $x^3 + 5x - 6 = x^3 + 15x$ **No**

5. One word problem similar to those from the “**Exam 3 - Word Problems (Solving Linear Equations) Practice**” document