

**Review for Test 3**  
**Math 098: Intermediate Algebra for Calculus**

KEY

**Format**

- The exam will be 4-6 pages in length, 15-25 questions and will last 50 minutes.
- It is a paper and pencil exam.
- You will need to show your work.
- You may use a graphing calculator. However, you may not use a symbolic calculator such as the TI-89.
- You must be able to answer warm up questions and paraphrase mathematical quotes:

Test 1 – Version E  
Dusty Wilson  
Math 151

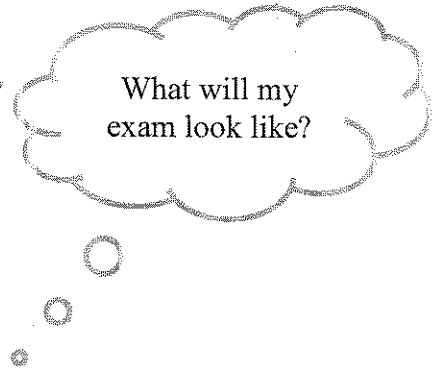
No work = no credit

No Symbolic Calculators

Name: \_\_\_\_\_

*God may not play dice with the universe, but something strange is going on with the prime numbers.*

Paul Erdős (1913 - 1996)  
Hungarian mathematician



Warm-ups (1 pt each):

$-4^2 =$  \_\_\_\_\_

$(-4)^2 =$  \_\_\_\_\_

$\frac{4}{0} =$  \_\_\_\_\_

1.) (1 pt) According to Erdős (see above), where is something unusual taking place?

<http://www.w-groups.dcs.st-andrews.ac.uk/~history/Quotations/Erdos.html>

**Basic Content.**

- You are responsible for sections 7.1-6, and 7.8.
- In addition to the material covered in the class, you are responsible for all of the basic facts you have learned since kindergarten. These include the facts that Barack Obama is the President of the United States of America,  $-1^2 = -1$ , and that  $1/0$  is undefined.

**In Studying . . .**

- You should be able to work through every question from a workalong.
- You should be comfortable with all the online quiz questions you have seen.
- You should be able to solve every homework question.
- You should be able to solve all review problems given in class.

**Ideas that may help with test prep . . .**

- Review the most recent material first.
- Consider recopying your notes.
- Summarize your notes. Make note cards for important formulas and definitions. Set them aside once the definitions are known.
- Rework examples from class and homework questions (in this order).
- Look to the review exercises for additional practice (in the textbook).
- Practice like you will play – do you know the material without your notes when the clock is running?
- Study with a friend to have more fun.
- Look to online resources such as the class videos, YouTube, and the Khan Academy to fill in holes.
- Show up at least five minutes early for the exam.
- Get a good night sleep . . . eat a healthy breakfast . . . and do something slightly active before the test to get your blood and brain moving.

## Chapter 7: Exponents and Radical Functions

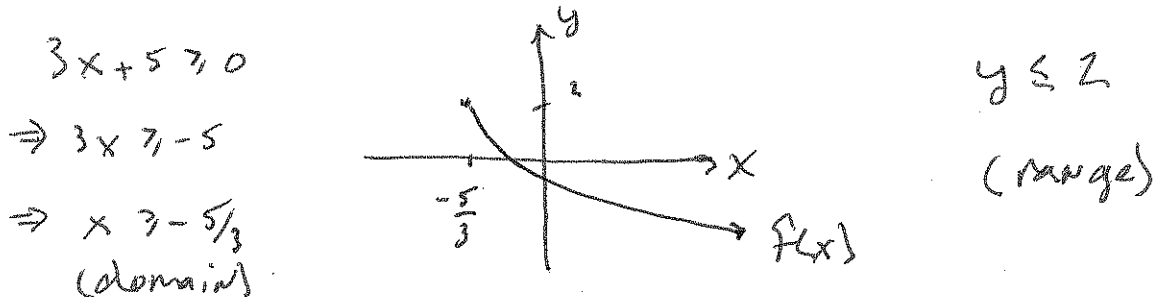
- Understand basic roots including how to evaluate them by hand and using a calculator.
- Find the domain and range of a radical function (the latter part using the graph).
- Understand the relationship between rational exponents and roots.
- Understand how to add, subtract, multiply, and divide radical expressions.
- Understand how to rationalize the denominator (this includes the conjugate)
- Solve radical equations making sure to check for extraneous solutions.
- Understand complex numbers and how to perform basic arithmetic operations with them.

Review questions (from the online practice test):

Example 1: Simplify  $\frac{2+3i}{2+5i} \cdot \frac{2-5i}{2-5i} = \frac{4-10i+6i-15i^2}{4-25i^2}$

$$= \frac{19-4i}{29}$$

Example 2: Determine the domain of  $f(x) = 2 - \sqrt{3x+5}$ . Use the graph to find the range.



Example 3: Simplify  $3^{-5/2} a^3 b^{-7/3}$

$$= \frac{a^3}{3^{5/2} b^{7/3}}$$

Example 4: Simplify  $(2\sqrt{3} + \sqrt{11})(\sqrt{3} - 5\sqrt{11}) = 6 - 10\sqrt{33} + \sqrt{33} - 55$

$$= -49 - 9\sqrt{33}$$

Example 5: Solve  $(\sqrt{4x-3})^2 = (2 + \sqrt{2x-5})^2$

$$\Rightarrow 4x - 3 = 4 + 4\sqrt{2x-5} + 2x - 5$$

$$\Rightarrow 2x - 2 = 4\sqrt{2x-5}$$

$$\Rightarrow (x-1)^2 = (2\sqrt{2x-5})^2$$

$$\Rightarrow x^2 - 2x + 1 = 4(2x - 5) \\ = 8x - 20$$

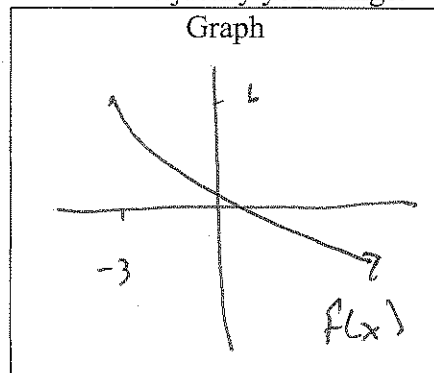
$$\Rightarrow x^2 - 10x + 21 = 0$$

$$\Rightarrow (x-7)(x-3) = 0$$

$$\Rightarrow x = 7 \text{ OR } x = 3$$

check ✓

Example 6: Algebraically find the domain of  $f(x) = 6 - \sqrt{x+3}$  and then use the graph to find the range. Sketch the graph in the box to justify your range.



Domain:  $x \geq -3$

Range:  $y \leq 6$

Example 7: Rationalizing the denominator and simplify  $\frac{4}{3-\sqrt{11}} \cdot \frac{3+\sqrt{11}}{3+\sqrt{11}} = \frac{12+4\sqrt{11}}{9-11}$

$$= \frac{12+4\sqrt{11}}{-2}$$

$$= -6 - 2\sqrt{11}$$

Example 8: Write an equivalent expression to  $6^{-\frac{2}{3}}x^5y^{-\frac{5}{4}}$  with positive exponents.

$$= \frac{x^5}{6^{\frac{2}{3}}y^{\frac{5}{4}}}$$

Example 9: Express  $-\sqrt{-72}$  in terms of  $i$

$$-\sqrt{-72} = -i\sqrt{72} = -6\sqrt{2}i$$

Example 10: Find and express the following in the standard form  $a+bi$ .

a.)  $\frac{4+3i}{2+9i} \cdot \frac{2-9i}{2-9i} = \frac{8-36i+6i-27i^2}{4-81i^2} = \frac{7}{17} - \frac{6}{17}i$

$$= \frac{35-30i}{85}$$

b.)  $(8-3i)-(9-5i) = -1+2i$

Example 11: Simplify  $\sqrt{3x^5}\sqrt{9x^4} = \sqrt{27x^9} = 3x^4\sqrt{3x}$

Example 12: Solve  $\sqrt{2x-1}+2=x$

$$\Rightarrow (\sqrt{2x-1})^2 = (x-2)^2$$

$$\Rightarrow 2x-1 = x^2-4x+4$$

$$\Rightarrow 0 = x^2-6x+5$$

$$\Rightarrow 0 = (x-5)(x-1)$$

$$\Rightarrow \textcircled{x=5} \text{ or } x=1$$

Example 13: Solve  $(\sqrt{4y+1})(3+\sqrt{y-2})^2$

$$\Rightarrow 4y+1 = 9 + 6\sqrt{y-2} + y-2$$

$$\Rightarrow 3y-6 = 6\sqrt{y-2}$$

$$\Rightarrow (y-2)^2 = (2\sqrt{y-2})^2$$

$$\Rightarrow y^2-4y+4 = 4(y-2)$$

$$\Rightarrow y^2-8y+12 = 0$$

$$\Rightarrow (y-6)(y-2) = 0$$

$$\Rightarrow y=6 \text{ or } y=2$$

Example 14: Rationalize the denominator of the expression  $\frac{\sqrt{7a}}{\sqrt{18}} = \frac{7a}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{7a\sqrt{2}}{6}$

Example 15: If  $g(x) = \sqrt{x^3 + 9}$ , evaluate  $g(-2)$ ,  $g(-3)$ , and  $g(3)$

$$g(-2) = 1$$

$$g(-3) = \sqrt{-18} = 3i\sqrt{2} \quad (\text{or undefined})$$

$$g(3) = \sqrt{36} = 6$$

Example 16:  $5i^5 + 4i^3 = 5i - 4i = i$