Department of Mathematics, University of Wisconsin-Madison

Math 101 Test #3
Spring 2010

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INSTRUCTOR: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

INSTRUCTIONS:

Time: **1 hour 15 minutes**
You **must show your work** to receive credit.
Problems involving fractions/radicals should be solved using fractions/radicals not decimals. No calculator.

You might need the following formula:

The vertex of a quadratic function is $(\frac{-b}{2a}, \frac{4ac-b^2}{4a})$ or $(\frac{-b}{2a}, f(\frac{-b}{2a}))$

Problem	Value	Score
1	15	
2	24	
3	12	
4	8	
5	16	
6	16	
7	9	
TOTAL	100	

1. (15 points) Simplify as much as possible.

(a) $\sqrt[3]{-64}$

(b) $9^{\frac{-3}{2}}$

(c) $-4^{\frac{3}{2}}$

(d) $-3\sqrt{72}$

(e) $(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})$

2. (24 points)Write the following expression in simplified form without negative exponents. Assume that all variables represent positive real numbers.

(a) $\sqrt{49w^8}$

(b) $\sqrt[3]{16x^4y^6}$

(c) $(\sqrt{x} + 3)^2$

(d) $(\sqrt{3ab^2})(\sqrt{21a^2b})$

(e) $2q\sqrt{48q^2} - \sqrt{27q^4}$

(f) $\dfrac{a^{\frac{5}{2}} a^{\frac{-1}{2}}}{a^{\frac{1}{3}}}$

3. (12 points) True or False. Circle the right answer.

   (a) $\sqrt{2}$ and $3\sqrt{2}$ are *like* radicals.

   True   False

   (b) $(\sqrt{y} + \sqrt{x})^2 = y + x$

   True   False

   (c) $\sqrt{\sqrt{x}} = x^{\frac{1}{4}}$

   True   False

   (d) The graph of $Q(x) = x^2 + 3$ is the graph of $y = x^2$ shifted down 3 units.

   True   False

   (e) The function defined by $f(x) = 2(x - 1)^2$ has a minimum value but no maximum value.

   True   False

   (f) The quadratic equation $x^2 + x + 2 = 0$ has no real solution.

   True   False

4. (8 points) Rationalize the denominator and simplify as much as possible.

$$\frac{y-2}{\sqrt{y}-\sqrt{2}}$$

5. (16 points) Solve.

(a) $z = \sqrt{-7z + 18}$

(b) $\sqrt[3]{5a + 3} - \sqrt[3]{a - 13} = 0$

6. (16 points)

   (a) Solve the following quadratic equation by completing the square.
   $x^2 + 2x - 3 = 0$

   (b) Solve the following quadratic equation by using the quadratic formula.
   $4x^2 = -4x - 1$

7. (9 points) For $y = -x^2 - 2x + 3$

    (a) Find the vertex

    (b) Find the y-intercept

    (c) Find the x-intercept(s)

    (d) Use this information to graph the function.