

**Exam 1. June 15, 2007.**

**Math 0115 Sec 0101. Summer 2007.**

*You may not use a calculator for this test. Please answer all questions on the answer sheets provided, with question 1 on the graphing grid. You may keep this test sheet.*

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[15] 1. (A) Sketch the graph of  $y = -3|x + 2| - 1$ . Be sure to label your graph appropriately. (B) Using your graph, state on which intervals the function is increasing and decreasing.

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[15] 2. The revenue generated from selling  $x$  units of a certain commodity is found to be  $R(x) = 75x - x^2$ , where  $R(x)$  is measured in dollars. (A) What is the maximum revenue? (B) How many units must be manufactured to meet this maximum? (C) Write the quadratic equation  $R(x)$  in standard form.

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[10] 3. Find the solution set to the following inequality and express it in interval or set-builder notation:  $|3x + 4| > 4$ .

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[10] 4. Find all  $x$  which make the following true:  $x = \sqrt{-2x - 1}$ .

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[10] 5. Let  $f(x) = \frac{1}{x^3} + 1$ . (A) Is  $f$  odd, even, or neither? Explain why, using the definitions of odd and even functions. (B) Is  $f$  a one-one function? If not, explain why. If so, find the inverse  $f^{-1}(x)$ .

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[10] 6. For each of the following, determine whether the equation describes  $y$  as a function of  $x$ . If not, say why. If so, what is the domain of the function?

$$(1) \quad x^2 = \frac{1}{3y^3 - 1} \qquad (2) \quad x^3 = \frac{1}{3y^2 - 1}$$

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[5] 7. Find the average rate of change of the function  $y = 4x^{-\frac{1}{2}} + 1$  from  $x = 4$  to  $x = 8$ .

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[10] 8. On a 440-mile drive from Washington, DC to Boston, MA, I stopped at a rest stop, then drove the rest of the trip at 60mph, which was 10mph faster than I had been driving before. If the entire trip took me 8 hours of driving, how much time did I spend in the car before the rest stop?

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[9] 9. Let  $f(x) = \sqrt{2x + 4}$  and  $g(x) = \frac{1}{x}$ . Find *and state the domain of*:

$$(A) \quad (g - f)(x) \qquad (B) \quad (g \circ f)(x) \qquad (C) \quad \frac{f}{g}(x)$$

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[6] 10. Give an example of each: (A) A real number that is not a rational number; (B) A rational number that is not an integer; (C) An integer that is not a natural number.

