

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

**Instructions**

Do the following problems on a separate sheet of paper (or two, or three, or four). You are allowed to consult the course text, the class notes, and the notes posted on the course website. You are not, however, allowed to collaborate with other students. **Write the solutions neatly and do not use multiple columns.** Staple your write-up, using this paper as the cover page.

**Problem 1** (2 points). Find the *exact* solution of

$$5^{3x+2} = 7^{2x+3}.$$

**Problem 2** (2 points). Find the *exact* solution of

$$\log_{17}(4x + 3) = 2.$$

**Problem 3** (2 points). Use the Laws of Logarithms to expand the following expression completely:

$$\ln \left( \sqrt[3]{\frac{e^{3x^3-12}}{(x^2+1)^3(x^3-7)^6}} \right).$$

**Problem 4** (2 points). Use the Laws of Logarithms to simplify the following expression; write the final answer as the logarithm of a single quantity, using only positive exponents:

$$\frac{1}{5} \ln(2x + 5) + 7 \ln(3x + 4) - 15 \ln(4x + 7) - \frac{3}{2} \ln(5x + 4).$$