

**Computational Mathematics**

Calculators are not permitted. Place all answers in the blank space provided. You are not expected to answer all questions.

\_\_\_\_\_ 1. Use  $i = \sqrt{-1}$  to simplify  $i^{23}$ .

\_\_\_\_\_ 2. Express as a single fraction in lowest terms:  $\frac{4^{-1} - 2^{-2}}{8^{-1} + 4^{-2}}$ .

\_\_\_\_\_ 3. Compute  $\log_3(27 \cdot 81)$

\_\_\_\_\_ 4. Simplify  $9\sqrt[3]{24} - \sqrt[3]{81}$ .

\_\_\_\_\_ 5. Express 14400 as a product of prime factors, using exponents, where possible.

\_\_\_\_\_ 6. Simplify  $\frac{-2^3 - |0 - 3^3| + 3(23)}{-20 \div 2(2)}$ .

\_\_\_\_\_ 7. Compute the product:  $\frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{5} \cdot \frac{5}{6} \cdot \frac{6}{7} \cdot \frac{7}{8} \cdot \frac{8}{9} \cdot \frac{9}{10}$ .

\_\_\_\_\_ 8. Simplify  $\frac{(1.8 \times 10^8)(5 \times 10^{-3})}{6 \times 10^{11}}$ . Write your answer in scientific notation.

\_\_\_\_\_ 9. State income tax is \$415 plus 7% of the amount over \$9000. What is your state income tax if your taxable income is \$38,000?

\_\_\_\_\_ 10. Find the smallest counting number that is a multiple of 2, 3, 4, 5, 6, 7, 8, and 9.

\_\_\_\_\_ 11. Find the LCM of 25, 35, and 120

\_\_\_\_\_ 12. Simplify:  $\frac{\frac{5}{x-1} - \frac{1}{x+1}}{\frac{x}{x-1} + \frac{1}{x+1}}$ .