

1. (4pts) Convert to scientific notation or a decimal number:

$$34789.31 =$$

$$3.989 \times 10^{-4} =$$

2. (14pts) Use formulas to expand:

$$(3y + 7)^2 =$$

$$(5u + v^2)(5u - v^2) =$$

$$(x + 5)^3 =$$

3. (13pts) Simplify, showing intermediate steps.

$$\sqrt{24} =$$

$$\sqrt[3]{-432} =$$

$$16^{\frac{5}{4}} =$$

$$\sqrt{75x^9y^6} =$$

4. (8pts) Simplify.

$$\frac{4x + 3}{x^2 + 3x - 28} - \frac{2}{x^2 - 16} =$$

5. (7pts) Simplify and write the answer so all exponents are positive:

$$\frac{4(9x^{-4}y)^{\frac{3}{2}}}{(2x^{-5}y^{\frac{5}{8}})^4} =$$

6. (6pts) Rationalize the denominator.

$$\frac{3 + 2\sqrt{5}}{4 + \sqrt{5}}$$

7. (11pts) Put the complex number into form $a + bi$.

$$\frac{3 + 2i}{3 - 5i}$$

(explain) $i^{171} =$

8. (13pts) Solve the equations.

$$\frac{2x + 1}{5} + 4 = \frac{3x + 2}{6} - \frac{2x - 7}{10}$$

$$\frac{3x - 4}{x - 2} + 4 = \frac{2}{x - 2}$$

9. (12pts) How many liters of pure anti-freeze needs to be added to 5 liters of a 15% solution of antifreeze in order to get a 50% solution? Write down the meaning of the variable you use.

10. (12pts) Ashley deposited some money in an account yielding 7%, and then deposited the same amount, and \$700 extra, in an account yielding 11%. How much did she deposit in each account, if after 9 months the interest earned from both accounts totaled \$408.75? Write down the meaning of the variable you use.

Bonus (10pts) An oil tanker can be emptied by the main pump in 4 hours. An auxiliary pump can empty the tanker in 9 hours. If the main pump is started now, when should the auxiliary pump be turned on so that the tanker is emptied in exactly 3 hours? (*Hint: Consider what portion of the job is to be done by the auxiliary pump.*)