

## Math 6a/d: Homework 1

Homework #1 is due September 25.

Please work on all problems. Keep in mind that some problems may be more difficult than others. If you cannot solve a problem, you may wish to try again later. If you still cannot solve it, please do not worry and just submit your best attempt. Do not write your answers on the homework assignment page; write neatly on separate paper, add your name and your class section (6a or 6d) on the top of the first page, scan or take a picture of it and submit it in Google Classroom.

### Review from Math 5

1. Rewrite each of the following expressions below in the simplest possible form, by collecting the like terms if possible.

(a)  $2x + 7 + 5x + 2 + 3x$       (b)  $3x + 9 + 5xy + 2xy + 3$       (c)  $3(2x - 1) + x$

(d)  $2a(a - 2) - a(a - 1)$       (e)  $(2x - 1)(x + 1)$       (f)  $(2x + 5y)(3x + y + 2)$

Hint: Use the distributive property of multiplication:  $a(b+c) = ab+ac$

Example:  $(x+y)(z+d) = x(z+d) + y(z+d)$

2. A boy had a bag of apples. He gave  $\frac{1}{2}$  of them to his parents,  $\frac{1}{5}$  to his brother,  $\frac{1}{4}$  to his sister and he ate the last apple himself. How many apples did he originally have?
3. An apple cost 9 cents, and an orange 15 cents. Even bought some apples and oranges, 20 fruit in all, and paid \$2.64. How many apples and how many oranges did she buy?
4. Two secretaries, Barbara and Mary, need to type a 100-page document. Barbara can type it in 4 hours; Mary types slower, so it would take her 5 hours to do this. How fast can they type it together if they divide the work between the two of them in the most efficient way?
5. If you take half my age and add 7, you get my age 13 years ago. How old am I?
6. Find the sum  $1 + 2 + 4 + \dots + 2^n$  (the answer, of course, will depend on  $n$ ). [Hint: first try computing it for several small values of  $n$ : find  $1 + 2$ , then  $1 + 2 + 4$ , then  $1 + 2 + 4 + 8$ . See if you can notice a pattern. After this, try formulating a general rule.]
7. Convert the decimal numbers to binary:  
9, 12, 24, 38, 45
8. Convert the following binary numbers to decimal:  
101, 1001, 10110, 11011, 10101