

## Math 6d: Homework 24

HW#23 is due April 14; submit to Google classroom 15 minutes before the class time.

*Please, write clearly which problem you are solving and show all steps of your solution.*

### Arithmetic sequences

Important formulas:

$$a_n = a_1 + (n - 1)d \qquad a_n = \frac{a_{n-1} + a_{n+1}}{2} \qquad d = \frac{a_s - a_t}{s - t} \qquad S = \frac{(a_1 + a_n) \times n}{2}$$

### Powers review

$$\begin{aligned} a^n &= a \times a \times a \times \dots \times a \text{ (} n \text{ times)} \\ a^0 &= 1 \text{ (read: } a\text{-to-the-zero)} & a^1 &= a \text{ is just itself 'a'} \\ (ab)^n &= a^n \times b^n & a^n a^m &= a^{n+m} & \frac{a^n}{a^m} &= a^{n-m} \\ a^n &= \frac{1}{a^{-n}} & a^{-n} &= \frac{1}{a^n} \end{aligned}$$

### Homework questions

1. If  $a = 2^{-13}3^9$  and  $b = 2^{11}3^{-7}$  what is the value of  $ab$ ? of  $a/b$ ?
2. How many zeroes does the number  $4^{15}5^{26}$  end with?
3. If  $a_3 + a_8 + a_{10} + a_{16} + a_{18} + a_{23} = 126$ , find the sum of the first 25 terms.
4. For an arithmetic sequence,  $a_1 + a_2 + a_3 = 102$  and  $a_1 = 15$ . Find  $a_{10}$ .
5. If 6 times the sixth term of an arithmetic sequence is equal to 9 times the 9th term, find the 15th term.
6. Find the sum of the first three elements of an arithmetic sequence for which  $a_1 + a_5 = 22$  and  $a_8 - a_5 = 6$ . Hint: can you write these equations with less number of unknowns?
7. Simplify the following expressions and show the answer in the exponent (power) form as a product of powers with simple bases.

(a)  $\frac{3^7 \cdot 2^7}{2^3 \cdot 2^4} =$

(b)  $\frac{6^5 \cdot 2^4}{3^5 \cdot 2^2} =$

(c)  $\frac{7^9 \cdot 2^5}{7^2 \cdot 2^4} =$

(d)  $\frac{11^4}{11^2 \cdot 5^2 \cdot 5^3} =$

(e)  $7^4 \cdot 11^2 \cdot 11^{-5} \cdot 7^2 =$

(f)  $\frac{3^{-5} \cdot 2^7}{3^{-3} \cdot 2^4} =$

(g)  $\frac{42^2}{6^2} =$

(h)  $\frac{3^5 \cdot 3^{-5}}{3^9} =$

(i)  $\frac{x^2 \cdot y^2 \cdot x^{-3}}{x^2} =$