

Math 6e: Homework 28

HW#28 is due May 20; submit to Google Classroom 15 minutes before class.

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

Geometric sequence (progression)

The n^{th} term: $b_n = b_1 \times q^{n-1}$

Sum of the first n terms: $S = \frac{b_1(1-q^n)}{1-q}$

Sum of infinite geometric progression, $0 < q < 1$, $S = \frac{b_1}{1-q}$

System of linear equations, solved by substitution

1. Simplify both equations.
2. From one of the 2 equations, express one of the unknowns (for example, x) in terms of the other one, $x = \dots$
3. Substitute the obtained expression in the other equation - you have an equation with one unknown (linear equation for y).
4. Solve this equation (find y).
5. Substitute the value for the second unknown (the y -value) back in the first equation (in $x = \dots$).

Homework questions

1. Solve by using substitution:

a)
$$\begin{cases} x = 5 \\ 20x + 5y = 100 \end{cases}$$

b)
$$\begin{cases} -8x + y = -4 \\ -21x + 2y = -13 \end{cases}$$

c)
$$\begin{cases} 7x - 3y = 27 \\ 5x - 6y = 0 \end{cases}$$

d)
$$\begin{cases} 2(x - 2) - 3(x + y) = 3 \\ (x + 1)(y - 2) = xy - 9 \end{cases}$$

e)
$$\begin{cases} \frac{2x-1}{5} + \frac{3y-2}{4} = 2 \\ \frac{3x+1}{5} - \frac{3y+2}{4} = 0 \end{cases}$$

2. Solve the system equations both by substitution and graphically:

a.
$$\begin{cases} 3x - 2y = -1 \\ x + y = 3 \end{cases}$$

b.
$$\begin{cases} x + 3y = -4 \\ x - y = 0 \end{cases}$$

3. **Optional:** In an infinite geometric progression, the n^{th} term is defined as $b_n = 6 \left(\frac{1}{3}\right)^n$. Find the sum.

Sketch the function $y = 6 \left(\frac{1}{3}\right)^x$ for the first few terms – what do you observe?

4. **Optional:** Find the second term in the geometric progression for which:

$$b_2 + b_5 - b_4 = 10 \quad \text{and} \quad b_3 + b_6 - b_5 = 20$$