Section 9.3 Geometric Sequences

geometric sequence: starting value a and common ratio r

$3, 6, 12, 24, \ldots$ ($\times 2$ each time)

$a_1, a_1r, a_1r^2, a_1r^3, \ldots$ ($a_1 = 3$, $r = 2$)

recursive definition:

$$a_n = r \cdot a_{n-1}$$

explicit definition:

$$a_n = a_1 r^{n-1}$$

Problem 1:

Is the sequence geometric? If it is, what are a_1 and r?

a. 5, 10, 50, ... ($\times 2$, $\times 5$)

$a_1 = 5$ no

$\frac{50}{10} \neq \frac{10}{5}$

b. -10, 6, -3.6, ...

$a_1 = -10$

$r = -\frac{3}{5}$

$\frac{-3.6}{6} = \frac{6}{-10} = -\frac{3}{5}$

$\frac{3.6}{60} = \frac{6}{10} = \frac{3}{5}$

Problem 2:

What are the second and third terms of the geometric sequence 2, __8__, __32__, 128?

$a_n = a_1 r^{n-1}$ a_1 $a_4 \rightarrow n = 4$ (a_n)

$\frac{128}{2} = \frac{2r^{4-1}}{2}$ $64 = r^3$ $4 = r$

Problem 3:

You work as a store manager and need to clear some inventory. You decide to discount each item by 30% of the previous week's price until the entire inventory is sold. The original price of one item is $60. What will be the cost of the item during the fifth week of the sale?

$a_1 = 60$ $r = (1 - 0.3) = 0.7$

$a_n = 60(0.7)^{n-1}$ a_6 $y = ab^x$ $a_1 r^{n-1}$

$a_6 = 60(0.7)^5 = \$10.08$

Problem 4:

What are the possible values of the missing term of the geometric sequence 28, a_2, 7?

$r = \frac{7}{a_2} = \frac{a_2}{28}$

$a_2^2 = \sqrt{28 \cdot 7}$ $4 \cdot 7 \cdot 7$ geometric mean

$a_2 = 2 \cdot 7$

$a_2 = 14$ 28, 14, 7