

/9K	/4A	/4C	/8T	Total	/25
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Name: Answers Date: \_\_\_\_\_

MCR3U

Quiz: Discrete functions and financial applications

/3  
K

1. Determine the 20<sup>th</sup> term in the sequence that begins with the numbers 45, 39, 33, ...

$$t_n = 45 + (n-1)(-6)$$

$$t_{20} = 45 + (20-1)(-6)$$

$$= -69$$

/3  
T

2. Determine an equation for the general term,  $t_n$ , in an arithmetic sequence with  $t_{10} = 50$  and  $t_{27} = 152$ .

$$t_{10} = 50 = a + (10-1)(6)$$

$$50 = a + 54$$

$$a = -4$$

↑  
increase of 102  
over 17 increases

$$d = \frac{102}{17} = 6$$

$$t_n = -4 + (n-1)(6)$$

$$= 6n - 10$$

/4  
C

3. Explain how to determine whether a sequence is arithmetic or geometric. Provide examples to illustrate your explanation.

Arithmetic: increases by a constant amount

ie. 2, 4, 6, 8, 10, ... [add 2 each time]

Geometric: increases by a constant factor

ie. 2, 4, 8, 16, 32, 64, ... [multiply by 2 each time]

/3  
K

4. Determine the sum of the first 8 terms in the series  $2 + 6 + 18 + \dots$

~~$$S_n = \frac{n}{2}(a + t_n)$$~~

~~$$S_8 = \frac{8}{2}(2 + t_8)$$~~

~~$$t_8 = 2 + (8-1)(4) = 30$$~~

$$S_n = \frac{a(r^n - 1)}{r - 1} = \frac{2(3^8 - 1)}{3 - 1} = 6560$$

/3  
K

5. Determine the sum of the arithmetic series  $4 + 15 + 26 + \dots + 213$ .

$$S_n = \frac{n}{2}(a + t_n)$$

↑  
which term is this? Need  $n$

$$S_{20} = \frac{20}{2}(4 + 213)$$

$$= 2170$$

$$t_n = a + (n-1)d$$

$$213 = 4 + (n-1)(11)$$

$$\frac{209}{11} = \frac{(n-1)(11)}{11}$$

$$19 = n-1$$

$$n = 20$$

/3  
T

6. Determine the number of terms in the sequence  $5, -10, 20, \dots, -10240$ .

$$t_n = ar^{n-1}$$

↑  
which term is this? Need  $n$

$$\frac{-10240}{5} = \frac{(5)(-2)^{n-1}}{5}$$

$$-2048 = (-2)^{n-1}$$

$$n-1 = \frac{\log 2048}{\log 2} = 11$$

$$n = 12$$

/4  
A

7. Lucy wants to have \$18 000 in her account 3 years from now to buy a car. How much must she invest per month, if her account earns 3.6% annual interest, compounded monthly.

$$A = 18000$$

$$i = \frac{0.036}{12} = 0.003$$

$$n = 3 \times 12 = 36$$

$$18000 = \frac{R[(1.003)^{36} - 1]}{0.003}$$

$$\frac{54000}{0.114} = R \frac{(0.114)}{0.114}$$

$$R = 473.68$$