

Tuesday, January 15, 2013

Agenda:

- TISK problems & 2 MM
- Lesson 12-1: Arithmetic Sequences
- Homework: Ch. 12 HW Packet #1 (§12-1 problems)

TISK Problems

- 1) Find the common difference: 1, -1, -3, -5, -7, -9, -11, ...
- 2) Evaluate: $5 - 3(5^2 + 7) \div 8$
- 3) Find the probability of rolling doubles on a set of two six-sided, fair dice.

§12-1 Arithmetic Sequences

- An arithmetic sequence is...
 - A sequence of numbers in which the common difference between terms is the first difference.
 - A sequence in which you obtain the next term by adding the same number to the previous term each time.
- Examples:
 - 4, 8, 12, 16, 20, 24, ...
 - 9, -3, -15, -27, -39, -51, ...
 - $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \frac{5}{3}, 2, \frac{7}{3}, \dots$

§12-1 Arithmetic Sequences

- The number you add to the terms to produce the next term is called the **common difference**, d .
- Each number in the sequence is called a **term** of the sequence.
- Using Symbols
 - If I want to talk about the 5th term, I would write: a_5
 - If I wanted to talk about *any term* in the sequence, I would write: a_n
 - How would you write the 20th term in a sequence?
 - a_{20}
 - How would you write the previous term in a sequence?
 - a_{n-1}
 - How would you write the next term in a sequence?
 - a_{n+1}

§12-1 Arithmetic Sequences

- Once you know a little information about a sequence, you can determine a formula for a sequence.
- Then, you can use that formula to find any term of the sequence you're interested in.
- Example:
 - Use the sequence: 8, 15, 22, 29, 36, ...
 - What is the 50th term of the sequence?
 - We don't want to have to list out all 50 terms do we?
 - So let's find a shorter way by doing a bit of thinking.

§12-1 Arithmetic Sequences

- Example:
 - Use the sequence: 8, 15, 22, 29, 36, ...
 - What is the 50th term of the sequence?
 - Every time we get a new term, how much are we adding? (What is the common difference?)
 - 7
 - So, to get the 3rd term, how many 7s did we add?
 - 8, 15, 22, ...
 - $$\begin{array}{c} \swarrow \quad \searrow \\ 7 \quad 7 \end{array}$$
 - To get the 3rd term we added 2 7s.
 - So how many 7s do you think we will need to add to get the 50th term?
 - 49 is correct!

§12-1 Arithmetic Sequences

- Example:
 - Use the sequence: 8, 15, 22, 29, 36, ...
 - What is the 50th term of the sequence?
 - How many 7s do you think we will need to add to get the 50th term?
 - 49 is correct!
 - What number did we start with? (What is a_1 ?)
 - $a_1 = 8$
 - So, we start with 8, then we add 49 7s. How much is 49 7s?
 - 49×7
 - $49 \times 7 = 343$
 - Therefore, $a_{50} = 8 + 343 = 351$.

§12-1 Arithmetic Sequences

- Let's formalize that by taking out the numbers and replacing them all with variables.
- What we did was we said to find any number term (the n th term), a_n
 - You find 1 less than that term, $n - 1$
 - Multiply that by the common difference, d
 - Then add it to the value of the first term, a_1
- Therefore, the formula for any arithmetic sequence is: $a_n = a_1 + (n - 1)d$

§12-1 Arithmetic Sequences

- Let's try it again.
- Find the 102nd term in the sequence: 50, 40, 30, 20, 10, ...
 - $d = -10$
 - $a_1 = 50$
 - $a_n = a_1 + (n - 1)d$
 - $a_{102} = \quad + (\quad - 1)(\quad)$
 - $a_{102} = 50 + (101)(-10)$
 - $a_{102} = 50 + (-1,010)$
 - $a_{102} = -960$
