Wednesday, January 23, 2013

Agenda:

- TISK problems, No MM
- Review HW 12-2
- Lesson §12-3: Other Sequences
- HW: Work on § 12-3 problems in HW packet

TISK Problems

1) Sketch a graph of the equation: $2y - 5x = -12$
2) Evaluate: $42 - 8 \div (3^2 - 5)20$
3) A bag of marbles holds 100 marbles. There are 30 red and 40 blue marbles, with the rest being a mixture of other colors. You draw a marble, note its color, then draw another marble without replacing the first. What is the probability that you draw a blue then a red marble?

Homework Check

9. Yes, it's geometric; $r = -2$
10. No, it's not geometric
11. Yes, it's geometric; $r = \frac{1}{2}$
12. No, it's not geometric
13. 234, 375
14. $\frac{2,187}{32,768}$
15. -131, 072

§12-3 Other Sequences

- Arithmetic and Geometric aren't the only sequences around!
- Many sequences can be created following different rules.
- Take the following sequence for example:
  - 1, 2, 1, 1, 2, 1, 1, 1, 1, 2, ...
  - Is it arithmetic?
  - Is it geometric?
  - But can you predict it? Does it follow some rule?

§12-3 Other Sequences

- Take the following sequence for example:
  - 1, 2,1, 1,2,1,1,1, 2, ...
  - Try to describe the rule.
    - It starts with a 1, then follows with a 2. Then after each two, you increase the number of 1s by one.
  - Predict the next 5 terms of the sequence.
    - 1, 1, 1, 1, 2

§12-3 Other Sequences

- 2, 3, 5, 7, 11, 13, 17, …
  - Is it a geometric sequence?
  - Is it an arithmetic sequence?
  - Is there anything special about these numbers?
    - The numbers are the prime numbers from least to greatest.
    - That's our "rule".
  - What are the next three terms?
    - 19, 23, 29

§12-3 Other Sequences

- 1, 4, 9, 16, 25, 36…
  - Is the sequence geometric?
  - Is the sequence arithmetic?
  - Is there a pattern?
    - Is there anything special about these numbers?
      - They're the perfect squares starting at 1^2
  - What are the next three terms?
    - 49, 64, 81

§12-3 Other Sequences

- You can sometimes get a hint about the rule for a sequence by looking at the differences.
  - If the first differences are common, then the sequence is *linear*…
    - … and will have an algebraic rule like
      $$a_n = mn + b$$
  - If the second differences are common, then the sequence is *quadratic*…
    - … and will have an algebraic rule like
      $$a_n = mn^2 + b$$

§12-3 Other Sequences

- Sometimes an algebraic rule is used to define a sequence instead.
  - For example:
    - List the first five terms of the sequence defined by $a_n = \frac{n}{n+1}$
      - $a_1 = \frac{1}{1+1} = \frac{1}{2}$
      - $a_2 = \frac{2}{2+1} = \frac{2}{3}$
      - $a_3 = \frac{3}{3+1} = \frac{3}{4}$
      - $a_4 = \frac{4}{4+1} = \frac{4}{5}$
      - $a_5 = \frac{5}{5+1} = \frac{5}{6}$

Another way to describe this sequence is that "the numerator and the denominator increase by one from term to term starting at $\frac{1}{2}$."

§12-3 Other Sequences

- Some sequences follow other rules.
- One very famous such sequence is called the Fibonacci sequence.
  - The Fibonacci sequence was discovered by Loenardo Pisano Bigollo, aka Leonardo Fibonacci, an Italian mathematician.
  - His sequence is simple.
    - Start with the numbers 1, 1…
    - Then add the previous two terms together to get the next term: 1 + 1 = 2
      - 1 + 2 = 3
      - 2 + 3 = 5
      - 5 + 3 = 8
      - 8 + 5 = 13
      - And so on… 1, 1, 2, 3, 5, 8, 13, …

§12-3 Other Sequences

- Why is the Fibonacci sequence so famous?
  - It's seen in SO MANY places in nature!
- Watch this video to find out more…
  - www.youtube.com/watch?v=ahXIMUkSXX0