Spiral Review

Simplify the factorial expression.

1. $\frac{2!}{4!} = \frac{2 \cdot 1}{4 \cdot 3 \cdot 2 \cdot 1} = \boxed{\frac{1}{12}}$

2. $\frac{5!}{7!} = \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \boxed{\frac{1}{42}}$

3. $\left(\frac{12!}{4! \cdot 8!}\right) = \boxed{495}$

4. $\left(\frac{10!}{5! \cdot 3!}\right) = \boxed{5040}$

p.570 8.1 Sequences and Series

Sequence: Use subscript to determine which term you are finding.

Example: $a_1, a_2, a_3, \ldots\ldots$

a_1 ← first

Summation Notation: Used when finding the sum of a certain number of terms in a sequence.

Example: $\sum_{n=1}^{8} 3n+1$

8 ← stop

$3n+1$ ← expression

$n=1$ ← start

Students will be able to write the first five terms of the sequence.

Example 1: Write the first five terms of the sequence. (Assume n begins with 1)

a.) $a_n = 4n - 7$

$a_1 = 4(1) - 7 = -3$

$a_2 = 4(2) - 7 = 1$ } +4

$a_3 = 4(3) - 7 = 5$ } +4

$a_4 = 9$

$a_5 = 13$

b.) $a_n = \frac{2n}{n+1}$

$a_1 = 1$

$a_2 = 1.3333 = \frac{4}{3}$

$a_3 = \frac{3}{2}$

$a_4 = 1.6 = \frac{8}{5}$

$a_5 = 1.6667 = \frac{5}{3}$

Students will be able to use the graphing calculator to find the first five terms of a sequence.

Example 2: Write the first five term of the sequence using the table feature on the graphing calculator. (round to 3 decimal places)

a.) $a_n = \frac{(1+(-1)^n)}{(3n)}$

$a_1 = 0$ $a_4 = .667$

$a_2 = .333$ $a_5 = 0$

$a_3 = 0$

b.) $a_n = \frac{3^n}{4^n}$

$a_1 = .75$ $a_4 = .316$

$a_2 = .563$ $a_5 = .237$

$a_3 = .421$

c.) $a_n = \frac{1}{\sqrt{n}}$

$a_1 = 1$ $a_4 = .5$

$a_2 = .707$ $a_5 = .447$

$a_3 = .577$

d.) $a_n = (3n-1)(n+2)$

$a_1 = 6$ $a_4 = 66$

$a_2 = 20$ $a_5 = 98$

$a_3 = 40$

Students will be able to write the first five terms of the sequence given the first term.

Example 3: Write the first five terms of the sequence defined recursively.

a.) $a_1 = 15$
$a_k = a_{k-1} + 3$

$a_1 = 15$
$a_2 = 15 + 3 = 18$
$a_3 = 18 + 3 = 21$
$a_4 = 21 + 3 = 24$
$a_5 = 27$

b.) $a_0 = -1$
$a_1 = 5$
$a_k = a_{k-2} + a_{k-1}$

$a_0 = -1$
$a_1 = 5$
$a_2 = -1 + 5 = 4$
$a_3 = 5 + 4 = 9$
$a_4 = 4 + 9 = 13$

Students will be able to find the sum of a sequence.

Example 4: Find the sum.

a.) $\sum_{i=1}^{6} (3i - 1)$

$= 2 + 5 + 8 + 11 + 14 + 17$
$= 57$

b.) $\sum_{i=0}^{5} 3i^2$

$= 165$

c.) $\sum_{j=3}^{5} \frac{1}{j+1}$

$= \frac{37}{60}$

d.) $\sum_{k=1}^{5} 4$

$= 20$

Turn-in:
p.577 (14, 26, 56, 96)

HW:
p.577 (7-25, 53-57, 87-97 odds)

** (17-25 part (a) only)