

AP Computer Science

Chapter 12 Program Assignments

Write a Java program for each of the following assignments. Make the input and/or output look like the following.

- 1) Type the “Towers of Hanoi” program found on pages 462 and 463. Save as “TowersOfHanoi.java”.
- 2) Write programs for the “sum”, “factorial”, “Fibonacci”, and “Hello World” recursion methods found in the lecture notes for section 12.1. Save as ‘SumRecursion.java’, ‘FactorialRecursion.java’, ‘FibonacciRecursion.java’, and ‘HelloWorldRecursion.java’. Make the input and output similar to the following example:

```
Find the sum of the integers from 1 to n.
```

```
Enter an integer for n: 5
```

```
The sum of the integers from 1 to 5 is 15.
```

- 3) Write a program using a recursion method that finds the nth term of the following sequence: 4, 11, 25, 53, 109, ... This sequence can be expressed as $a_n = 2a_{n-1} + 3$, where $a_1 = 4$. Save as “Sequence1.java”.

```
Find the nth term of the sequence 4, 11, 25, 53, 109,...
```

```
Enter an integer for n: 6
```

```
The 6th term of this sequence is 221.
```

- 4) Write a program using a recursion method that finds the nth term of the following sequence: 5, 10, 15, 20, 25, ... Save as “Sequence2.java”.

```
Find the nth term of the sequence 5, 10, 15, 20, 25,....
```

```
Enter an integer for n: 10
```

```
The 10th term of this sequence is 50.
```

- 5) Write a program that reads 50 integers from a text file named “randomintegers.txt” and places them into an array. Sort the integers in the array into ascending order using the quicksort sort method. Print to the screen the numbers in the array. Save the program as “QuickSort.java”.

```
The integers in ascending order are listed below:
```

```
0  
4  
5  
.  
.  
487  
488
```

- 6) Write a program that reads 50 integers from a text file named “randomintegers.txt” and places them into an array. Sort the integers in the array into ascending order using the merge sort Print to the screen the numbers in the array. Save the program as “MergeSort.java”.

```
The integers in ascending order are listed below:
```

```
0  
4  
5  
.  
.  
487  
488
```