

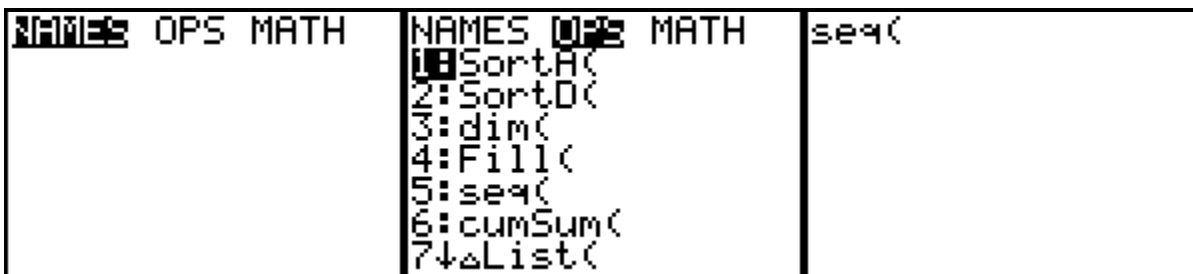
### Series on a TI-83 Calculator

You can have the calculator sum a finite series of the form  $\sum_{n=0}^N a_n$  so long as you can write an explicit formula for  $a_n$  and  $N$  is not too large. You can also estimate an infinite series  $\sum_{n=0}^{\infty} a_n$  by choosing a large value for  $N$  and evaluating  $\sum_{n=0}^N a_n$ .

The basic idea is to define a sequence (or list) using the “seq(” command, and to use the “sum(” command to add up the values in the sequence. Start by going to the “Home” screen and clearing the screen.

**Example:** To estimate  $\sum_{n=0}^{\infty} \frac{5^n}{n!}$ , we will ask the calculator to compute  $\sum_{n=0}^{50} \frac{5^n}{n!}$ . The terms in the sum are  $\left\{ \frac{5^0}{0!}, \frac{5^1}{1!}, \frac{5^2}{2!}, \dots, \frac{5^{50}}{50!} \right\}$ . To have the calculator create this list, we will enter the command  $\text{seq}\left(\frac{5^n}{n!}, n, 0, 50\right)$  as follows.

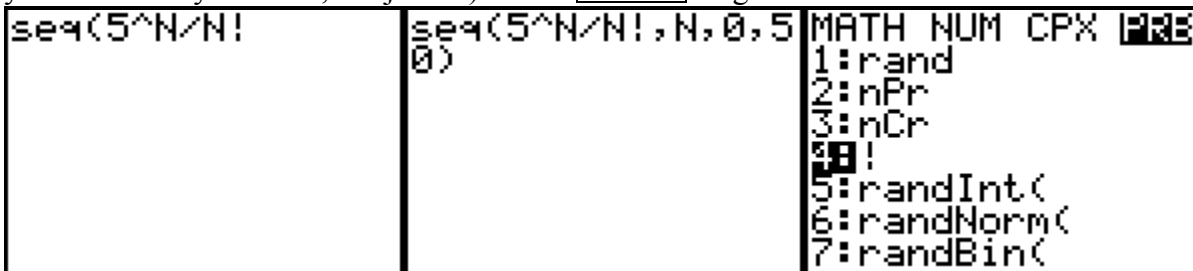
Access the “List” menu by pressing  $\boxed{2\text{nd}} \boxed{\text{STAT}}$ . (You may or may not have something under the column “NAMES.”) Highlight the “OPS” column, then press 5.



Following the “seq(” command enter

$$5 \boxed{\wedge} N \boxed{\div} N!$$

You access the variable N by pressing  $\boxed{\text{ALPHA}} \boxed{\text{LOG}}$ , and you access the factorial symbol by pressing  $\boxed{\text{MATH}} \boxed{\leftarrow} 4$ . Then continue the line by entering  $N \boxed{,} 0 \boxed{,} 50 \boxed{)}$ . (Actually, you can use any variable, not just N.) Press  $\boxed{\text{ENTER}}$  to get the list.



You don't actually see all 51 entries at once. But you could press the right arrow key to scroll the list to see more to the right. However, what you really want is the sum of that

sequence. Press **2nd** **STAT** again to access the list menu. Press the left arrow once to highlight "MATH." Then press 5.

|  |  |  |
|--|--|--|
| seq(5^N/N!,N,0,5<br>0)<br>{1 5 12.5 20.83... | NAMES OPS <b>MATH</b><br>1:min(<br>2:max(<br>3:mean(<br>4:median(<br>5:sum(<br>6:prod(<br>7↓stdDev(<br>↓ | seq(5^N/N!,N,0,5<br>0<br>{1 5 12.5 20.83...<br>sum(<br>↓ |
|--|--|--|

Because the last command was computing the list, we want to sum the "answer." Press **2nd** **(-)** **( )** **ENTER**.

|   |  |
|---|--|
| seq(5^N/N!,N,0,5<br>0<br>{1 5 12.5 20.83...<br>sum(Ans) | seq(5^N/N!,N,0,5<br>0<br>{1 5 12.5 20.83...<br>sum(Ans)<br>148.4131591 |
|---|--|

You can check that this is a good approximation of  $e^5$ .